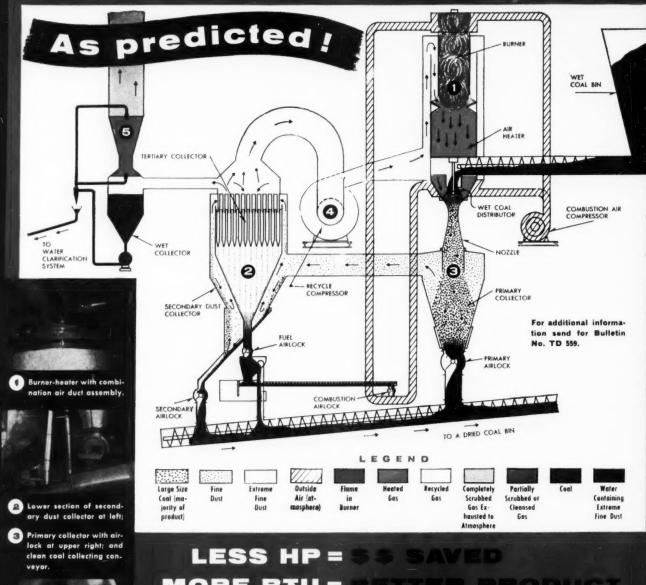
COAL

MAY, 1960

PRICE \$1

A McGRAW-HILL PUBLICATION

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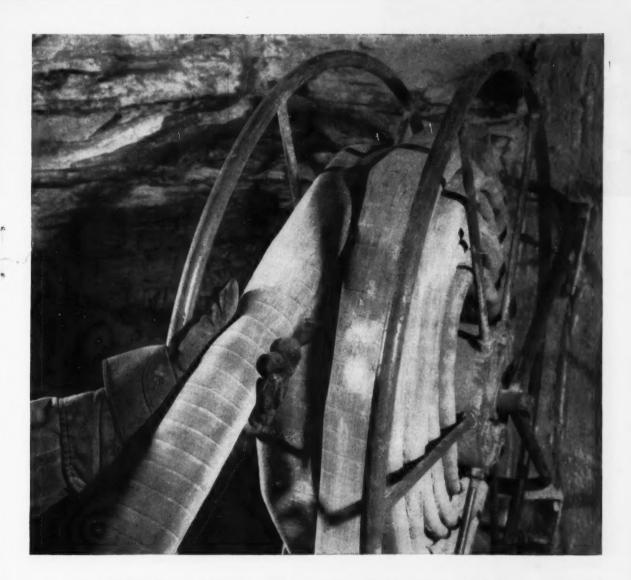
*Tailor Stream-Flo Thermal Dryer is the trade name for thermal dryers of Tailor & Co., Davenport, Iowa.

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Service life jumps from 6 to 18 months with B.F. Goodrich hose

In this underground mine, fire hose had to be replaced every six months. Acid, water and mine dampness caused cotton-jacketed hose to mildew and rot. Hose life was further shortened by constant exposure to abrasive dolomite dust.

Then a B.F.Goodrich distributor told the mine superintendent about a new industrial fire hose, developed by B.F. Goodrich to overcome just such problems. A special rubber compound was developed for the cover of B.F.Goodrich Pinnacle hose to give it high resistance to acids, chemicals, weather, abrasion

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WHY YOU RARELY SEE SMOKE FROM EQUIPMENT REPOWERED WITH CAT ENGINES

Some diesel engines smoke almost all of the time. They can't help it. It's the way they're made. Diesel smoke can be a minor annoyance or a major headache, depending on the way the engine is used—and where it's used.

You rarely see smoke coming from the exhaust of equipment powered by Caterpillar Diesel Engines. This is because of the way they are designed. They are four-cycle engines and each has the exclusive Caterpillar adjustment-free individual fuel injection pumps and non-fouling single orifice injection valves. This system is simple, reliable and economical.

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The Caterpillar precombustion chamber permits use of lower cost fuels. Even then, you'll rarely see smoke because of Caterpillar's highly efficient fuel system.

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tunnel project had this to say about a Plymouth locomotive powered with a Cat D326, "We can pull twice the load and not smoke up the tunnel." Performance of the Caterpillar-powered Plymouth was so outstanding, the company ordered another identical unit.

When you repower with a Cat Diesel, you save several thousand dollars a year on fuel alone, over the cost of, say, gasoline. You save on power maintenance because Cat Engines require infrequent care and are easy to care for. Service and genuine parts are available from your Caterpillar Dealer. The repowering installation is usually very simple and seldom takes your equipment out of action for much time. Compact Caterpillar Diesels put a lot of productive power in relatively little working space.

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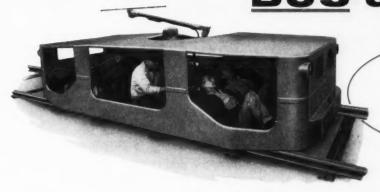
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MINE PORTAL BUS

There's no wasted motion with this selfpropelled Portal Bus because it is fast on the take-off, saving manpower time for conversion into more tonnage. And it is designed for safety, with hydraulic operated running brakes plus mechanical emergency and parking brakes direct on the wheels. For severe grades, optional electric dynamic system produces braking effect from the motor for extra safety under all conditions. Also the split roof construction gives operator unimpeded, all directional view, while the trolley pole is always within quick reach. This bus is powered by 15 H.P. motor and will haul 13 to 17 men.

Lee-Norse MINE JITNEY

The Mine Jitney is the "Jack-of-all-Trades" of the mine fleet because its versatility enables it to be used on the regular job and for emergency. It can handle the job of furnishing fast, safe transportation of key personnel, maintenance crews and special groups; and can double up as an ambulance or fire-fighting equipment car. Designed with twin braking systems for added safety. Powered with either



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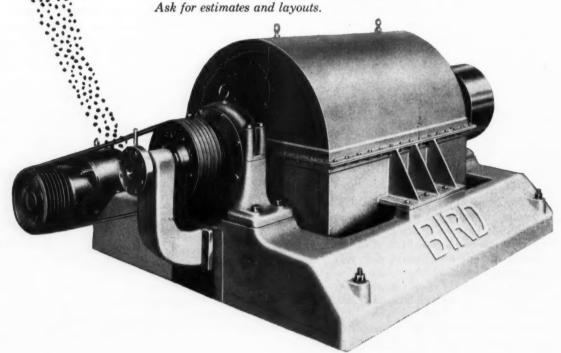
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Neither vacuum nor vibration can do the best job on this fine coal.

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Time and again the Bird has proved its ability to dewater these fines thoroughly and economically. No auxiliary equipment is needed. Overall cost including write-off, power and maintenance is seven cents or less per ton of dewatered fines.



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Deep Mining, Preparation

A. E. Flowers, Associate Editor, Coal Age

Rochester & Pittsburgh Coal's new O'Donnell No. 2 mine near Sand Fork, W. Va., combines continuous mining with conventional methods to produce coal from the Pittsburgh seam. In 1960 production will reach 800,000 tons and will climb to 1,200,000 tons in 1961. Entry development features five headings with track loops every 300 ft. Shuttle cars discharge directly into 8-ton mine cars handled by hydraulic car spotters. Targets on mine cars and electrically-controlled door trippers make it possible to dump coal or rock in proper bins without slowing the trip as it moves across storage bins. Preparation includes jig washing, centrifugal and thermal drying, and water clarification.

Also—Milestones in R&P history; how closed-circuit TV makes possible remote operation of hoist; how electric door trippers operate.

Coal's Future

Bituminous Coal Consumption p 84

W. Gibson Jaworek, Graduate Assistant, and John J. Schanz Jr., Associate Professor, Department of Mineral Economics, The Pennsylvania State University, University Park, Pa.

Two mineral economists subject bituminous coal to a

preliminary mathematical study in a search for a more logical method of estimating the level of bituminous coal consumption for the next decade. They predict for the period 1960-1970 a sharp increase in consumption of bituminous coal in electric generation, together with a moderate expansion in other markets. Total consumption in 1970 is projected at 631 million tons, up 47.4% from the 1960 estimate of 428 million tons.

Bonus—Year-by-year estimates of consumption by markets 1960-1970.

Overburden Preparation

Breaking Overburden At
Today's Strip Mines p 94

Today's strip operators are studying more closely drilling methods and hole patterns, and are becoming more proficient in using breaking mediums. Seismic analysis enables operators to determine quickly, easily and economically the consolidation of over-burden. As a result, they can choose the most suitable equipment for breaking and handling the material. Vertical drilling is favored in higher banks. Horizontal drilling is the choice for thinner cover. Ammonium nitrate-oil mixtures continue to lead as breaking medium, but operators are stressing better mixing and packaging.

Extras—Typical drilling and shooting patterns in various conditions; a roundup of drill performance.

Maintenance Ideas

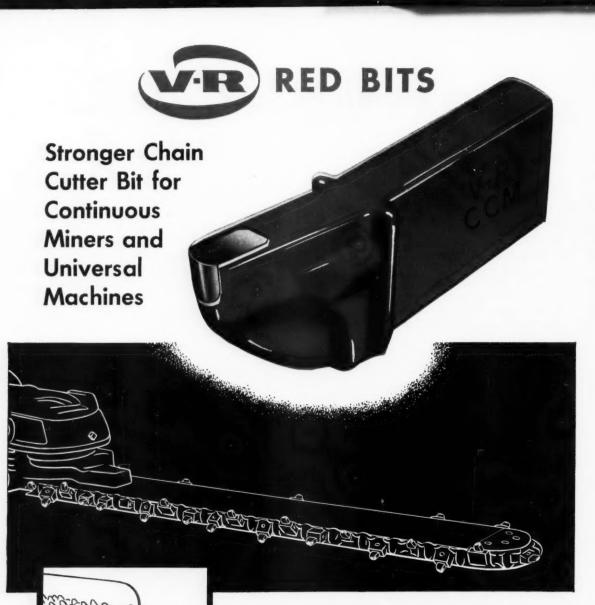
Preventive Maintenance:

Records Make the Difference p 102

R. W. Greer, Coal Machinery Div., Joy Mfg. Co.

A report and record system is a prerequisite for a follow-through approach to maintenance practices and procedures. Well-planned record forms and consistent use of these forms will provide the facts around which an effective maintenance program can be developed. These forms will show breakdowns for each machine

COAL AGE, May, 1960, Vol. 65, No. 5. Published monthly on the 1st by McGraw-Hill Publishing Co., Inc. Publication office, Third & Hunting Park Ave., Philadelphia 40, Ps. United States subscription rats for individuals in the field of the publication \$3 per year; single copies \$1. Second class postage paid at Philadelphia, Ps. For additional information see p. Prostmosters Pleese send Form 3579 to Coal Age, 330 W. 42nd St., New York 36, N. Y.



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CREATING THE METALS THAT SHAPE THE FUTURE

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WAUKEGAN, ILLINOIS

This Month in Coal Age-Cont'd

and why, repair-time allocations for the period, repairs effected, general condition of each machine through periodic inspection, general maintenance for the period covered and summations of the preceding items provide a workable maintenance history.

Bonus—Illustrations of all the forms needed in setting up a record system.



Safety

Harwick's Big Year in Safety p 110

A positive safety attitude that begins with Duquesne Light's chief executive, spreads to the company's mines and power plants, and then filters down through supervisors to all employees is a major factor in setting a new safety record at Harwick mine. From Dec. 9, 1958, to Feb. 1, 1960, Harwick had no lost-time accidents and this record is being extended each day. Up to Feb. 1, 1960, Harwick had worked 418,105 man-hours without a lost-time accident while producing 571,476 tons. Mine officials emphasize that labor cooperates fully and note that employee efforts play a major role in the safety program. Regular safety meetings, effective use of bulletins and literature, and modern mining methods contribute heavily to the safety record.

▶ Face Preparation

Thick-Seam Face Preparation p 114

Seam height at Moss No. 3 mine, Clinchfield Coal Corp., varies from a low of 10 ft to a high of 18 ft. The object at the mine is to produce both metallurgical and steam coal. The system of breaking the coal employs explosives with millisecond-delay caps to provide the time-saving advantages of multiple-hole shooting. Development of the system included training the shot-firers and setting up procedures for handling explosives.

Highlight—Diagrams of shooting patterns.

(Continued on p 9)

This month in COAL

PLUS AT LAST—Bituminous coal production turned the corner at the end of March—though not in any tearing rush—and ran generally ahead of last year's figures in April. This situation should continue in May and June, leaving the industry with a gain of a few million tons for the first half. After that, in view of the low rate of output in July and August last year, the gains should be bigger.

And Anthracite—The weather, which hampered bituminous in the early months, finally came to anthracite's rescue, with the result that weekly output jumped ahead of 1958 early in April. This cut hard coal's deficit but it still will wind up with another loss at the end of the first half. Second-half results, as always, will reflect primarily the temperature as the industry goes into the next coal-burning season.

NO HELP FROM GOVERNMENT-Actions in both the U. S. and Canada in April made it clear that coal will have to continue to battle low-priced and dump oil and gas head-on in the marketplace. On the oil side, import quotas for residual were increased by Secretary Seaton, leading to the conclusion that if he can do it once he can do it again. Thus coal, which so far has done a fairly good job of competing with oil for heavy fuel uses along the Atlantic Seaboard, will be battling an added handicap. In Canada, the Energy Board, not unexpectedly, released almost all the natural gas requested by U. S. pipeline companies and distributors. Though a big share went to the West Coast, oil and coal will meet increased pressure in the Middle West and perhaps the East. And in addition, Canada continued the freight subventions to the western and Eastern Maritime provinces for shipments abroad and to the Canadian interior, which U. S. coal representatives had argued against. The eventual stake in all these actions is quite a few millions of tons.

FUELS POLICY—The coal industry was joined in April by independent petroleum producers in backing a resolution for a Congressional investigation into the desirability of national fuels policy. This, plus elimination of a provision for consideration of end-use allocation of fuels, improved the chances of the resolution in this session, though passage still is not a sure thing. But in contrast to the actions noted in the preceding section, it gave ground for expecting that industry pressure eventually will have the desired result.

PLUSSES TOO—To offset some of the adverse actions, such as those by the U. S. and Canadian governments, coal could point to a fair list of actions and trends in its favor, which should contribute to improving its position in the future. For one thing, it is enjoying good relations with the public. For another, some of its big customers are showing firm signs of sticking. U. S. Steel, for example, has optioned big reserves in western Canada. And some competitive customers are striking back. An apartment-house owner in Minnesota made a gas company ante up for the extra cost he incurred by converting as a result of representations that he would save money. He didn't.

Hold fast in mine roof



Ohio Brass 4-Way Expanding Anchors hold in both soft shale and hard rock

- GO UP FAST . . . 4-way expansion begins with the first turn of the wrench.
- **DEVELOP TOP HOLDING POWER** with easy wrenching effort .. 150 "foot pounds" of torque gives bolt tensions of 9000 pounds.
- WORK IN CLOSE QUARTERS . . . O-B engineers developed these anchors underground. Personal knowledge of mining problems enabled them to design units that are especially suited to your needs.
- GET SERVICE for your roof bolting problems . . . see your local Ohio Brass engineering representative or write Ohio Brass Company, Mansfield, Ohio.

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AND CONTROL EQUIPMENT . ELECTRIC HAULAGE



O-B Bail Type Expansion Shell and Plug

Mr. Charles Maynard Mine #3

Chuck:

This is the shell I talked to you about last week at the mine. Roof bolting is right up O.B's alley...they pioneered the use of expansion units ... probably know more about them than anyone in the field. I suggest you get in touch with their local sales engineer. I've found Ohio Brass people are glad to work right with you in the mine.

Regards.

■ Utility Markets

J. R. Forsythe, General Manager, Keystone Coal Buyers Manual

Electric utilities in the United States will require 40% more fossil fuel by 1965, 70 million more tons of coal, 31 million more tons of gas and 4 million more tons of residual oil. This study represents the views of 200 utility companies, representing close to 80% of the total national fuel burn.

Statistics—Tables of changes in electric-utility demand for fossil fuels, 1959-60, showing expected increases or decreases of use of each fuel in each region for the years 1960, 1961, 1962, 1963 and 1965.

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This Month

in

Mining Practice

NEW DIESEL PUSH?—Though it has subsided somewhat in the weeks since the Island Creek fire, the interest in new power and haulage setups to reduce the chances of ignition is still keen. One result is additional impetus to the trend to AC, which is inherently safer than DC from a number of standpoints. Another is revival of the drive to get the unofficial yet potent bars to the use of diesel locomotives underground. Cold logic favors the move, and it could happen in the near future. Finally, the search for alternatives to electrically operated equipment will be stepped up, with hydraulic mining as perhaps the frontrunner.

AND ESCAPEWAYS—As another result of the fire, the question of refuge areas or rooms is now before the industry. There is, however, not complete agreement as to their possible helpfulness, with some feeling that they might actually turn out to be traps under certain conditions. But there is general agreement on (a) the need for the maximum practicable number of free and clear alternate escape routes and (b) on careful training of men in escapeway locations and how to use them.

STUMP MINING—Continuous mining is no exception to the rule that getting that last stump is the most ticklish and hazardous part of the mining operation. Remedies include modification of the mining plan to limit machine and man exposure. Adherence to the plan then becomes imperative. The best in roof support is of course fundamental. But falls continue to occur, bringing in the question: "Are there additional possibilities?" There may be in the roof shield, for example, while protection for men, even if not for the machine, can be enhanced by remote controls, which already have proved their effectiveness.

PREPARATION TRENDS—The year 1960 may yet prove to be one of the more-active in history from the standpoint of new preparation facilities. The big push is in fine-coal facilities, drying units, and water handling and clarification equipment. This latter reflects, among other things, the pressure to meet pollution regulations, particularly those governing solids. What may be done about acid in preparation water, now the subject of a basic ORSANCO control order, is still a question. The situation probably calls, however, for more study of neutralization facilities and materials, which also can help cut the plant maintenance load.

EXPLOSIVE SPOILING—Refinements in manufacturing and use continue to widen the horizons of ammonium nitrate in overburden shooting. Now, among other things, it is being increasingly advocated for spoiling in addition to breakage. In other words, the idea is to drill more and load heavier to blow up a third or more of the cut into the spoil. As a byproduct, a dragline on the spoil would become a commonplace sight, especially in the higher banks. Thus an old idea, occasionally practiced when conditions were right even in the days of more-costly high explosives, becomes increasingly applicable with AN improvements, the end of which is not yet.



HANDLE WITH ABANDON!

U.S. Matchless Wire Braid Air Hose

No "babying" needed here! U.S. Rubber Engineers designed this premium quality hose with more than enough brute strength and stamina to withstand the highest working pressures, the toughest construction conditions.

And U.S. Matchless® has proved its ability to take both use and abuse indefinitely—on jobs around the world-serving long after ordinary hose has been ruined by abrasion, crushing and high pressure.

Yet in spite of its great strength, U.S. Matchless is highly flexible-practically as easy to handle as a garden hose.

Mandrel-made, wrapped-finish U.S. Matchless Wire Braid Air Hose is available in 50 ft. lengths.

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

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The Coal Commentator

All That's Needed

Electric home heating is a fascinating subject how fascinating may be judged from the fact that it could almost at one blow knock competition out and put coal back in the home market permanently. In fact, at the First National Electric House Heating Symposium and Exposition, Chicago, March 21-23, the blunt statement was made that all homes would be electrically heated in the not-too-distant future.

It can be done because of the low cost of coal—a hurdle competition can't surmount unless it wants to wreck itself by selling below cost indefinitely. True competition can make trouble at times and in spots but basically it can't compete in fueling power plants on anything like realistic prices based on cost.

When this comes to pass, then what? Without the home market and locked out of the utility market, where can oil and gas turn? One obvious place is general industry for heat and power. In fact this already is a major target, but the pressure definitely will rise. Need coal be afraid that it would lose the battle? No, unless it falls down badly on equipment development, merchandising and service. It has the cost advantage here as well as elsewhere. All it needs is convenient, reliable burning equipment and the will to go out and get the business.

Significant Contribution

As continuous mining spreads the question of machine operating time looms larger. The reason is the increasing need for getting the most out of the investment in equipment, materials and labor.

Many things enter into the question of operating time. One, of course, is the degree of continuity possible under the mining plan. Maintenance is the second big limit on operating time. Normal inspection, service and overhaul must be figured into any operating record. The amount, among other things, reflects operator skill, abuse and inherent machine resistance to wear and breakdown. Even if the mining system permitted 100% operating time, this latter would prevent achieving it at the present time. Recognizing this, the manufacturers are mounting a drive to build the maximum in breakdown resistance into equipment.

The results of this program should become fairly evident in the very near future. They should contribute significantly to increasing production time to 85% or better, compared to the present average of 50 to 60% for continuous units.

Different Now

On March 30 the coal industry, in the persons of the chairman and president of the National Coal Association, achieved a rare distinction in the United States—a visit with the President and an opportunity to tell coal's story in a really high place, as well as a chance to leave him a model of the new 115-cu yd shovel as evidence of coal progress.

This visit highlights the fact that coal is building on what is already a hard core of public interest and respect. Many can remember that it was a great deal different. In short, real progress has been made, as even the doubters must admit, though there are still some sour notes. A little more push, especially by those not yet active in public relations, will keep the number of sour notes falling.

No Victory

The "Methane Pioneer" completed, in March, its 7th trip to Great Britain with its 7th cargo of liquefied gas, equivalent to something over 5,000 tons of coal, for the British Gas Council. This was the end of the trial shipments, leaving for answer the question, "What next?"

So far, there is no answer. The Gas Council noted that the economics of the operation have not yet been worked out. As for the British government, Paymaster-General Lord Mills stated it thus: "Let me put it this way: there is no such proposal [further importation] before the government at this time."

One interest of the coal man in the U. S. is whether the experiment may pan out and, if so, what effect it might have on an already depressed export level. Until the findings are announced, it is still a guess as to the economics. If it proved out, then any U. S. coal movement to gas manufacturers abroad, particularly in Europe, would be in jeopardy.

How does your Commentator bet? No clearcut victory for methane, liquefied or not.

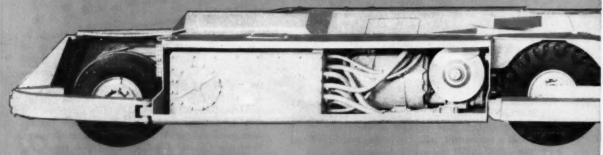
Fifty Million

The fact that 50 million bolts represents only about 15 mo of usage is one indication of the growth of roof-bolting. The 50 million represented, as of February, the total output of one manufacturer – Connors Steel Div., H. K. Porter.

Painted white, this 50-millionth "West Virginia" bolt went to the Van (W. Va.) mine of Youghiogheny & Ohio Coal Co. Its installation was marked by the presentation of a plaque, by Charles A. Gaisch Jr., of Conners, to Glenn Kitchen, mine superintendent at Van.

Fifty million of anything is a lot of millions—even for what is now so commonplace an item as a roof bolt. So it is in order to voice a sincere "well done" to both Connors and Youghiogheny & Ohio for a major contribution to safety in coal mining. Faster Trip Time ... Better Haulage

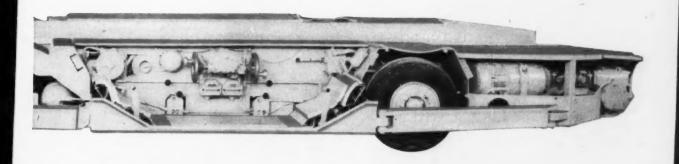
with JOY 18-SG



Shuttle Cars



18-SC Shuttle Cars are flexible and easy to maneuver. Wheel unit maintenance has been reduced to a minimum by eliminating gears.



Joy's revolutionary six-wheeled 18-SC Shuttle Cars use two wheels for traction and four for steering. They have proven underground that they increase haulage efficiency. Faster trip times, plus capacity up to 50% greater than competitive cars, have resulted in substantially greater tonnage per shift.

Trip time is improved because operators find that they can tram at top speed from face to discharge point in safety and comfort. The hinged-center design enables the cars to follow the bottom, improving traction and eliminating the danger of "roofing." The hinged-center also eliminates the need for an elevating discharge conveyor, since the 18-SC's can run right up a ramp and discharge directly on to the belt. A hydraulic traction-booster can be engaged for extra traction in bad bottom and on grades. The straight-through conveyor unloads the 18-SC Shuttle Cars in thirty seconds or less, to further cut trip time.

18-SC Shuttle Cars are available in 27", 32" and 40" heights, and in various widths, to suit mining conditions. Consult your Joy representative for full information on how these 18-SC cars can cut your haulage costs.



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installation and testing of Bethlehem
mine roof bolts and accessories.

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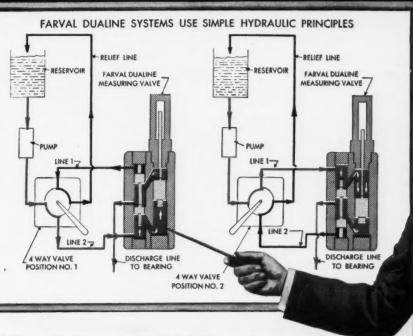




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Lubrication
No. 246

"For positive lubrication of large, medium and heavy-duty installations ...it's a Farval <u>Dualine</u> System!"



With Farval Dualine centralized lubricating systems you get the following distinct advantages over other type systems . . .



- (a) Much lower operating pressures with consequently less danger of soap separation on grease systems. Also, less danger of system damage due to high lubricant pressures.
- (b) Large lubricant passages with no pinhole ports, ensures practically full pump pressure for every metering valve. This is one of the reasons why Farval Dualine systems operate on lower pressures give less sieving and working of lubricants.
- (c) Positive indication at each bearing does not have to depend on the questionable action of a single indicator at the pump.
- (d) Each metering valve individually adjustable for the requirements of the bearing it serves.
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- (f) True lubricant metering. Quantity of lubricant delivered to one bearing is not dependent on any other valve in the system.
- (g) Much easier to spot and correct trouble.

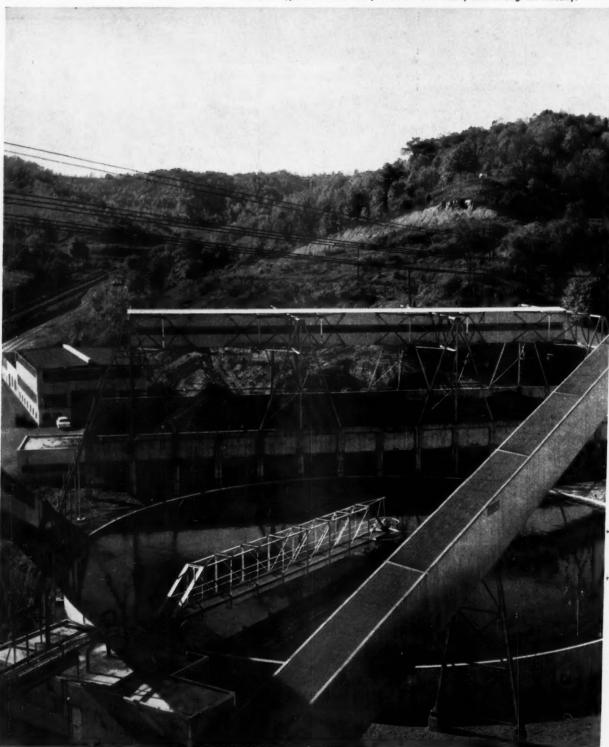
Check with your Farval Representative and see how these versatile systems can improve production operations — reduce costs. Or write for free Bulletin 26-T containing complete engineering information on Farval Dualine systems.

Farval Division
Eaton Manufacturing Company
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HOW MAJOR EAST COAST MINE HANDLES

The Dorr Type S Thickener is a proven unit now widely used throughout industry.



BLACK WATER IN A CLEAN STREAM AREA

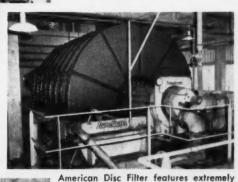
Dorr Thickener and two American Disc Filters close preparation plant water circuit

Located in an area free of industrial pollution, preparation plant water handling could have presented a serious problem at this large Northern West Virginia mine. It was imperative that no black water bled back into the creek. The problem was solved — and the water circuit closed — by the use of a 170′ Dorr thickener in conjunction with two 10′6″ dia. by 10 disc American filters.

Primary feed to the thickener is the overflow from the table-refuse drag tank plus other black water. 65 tph makeup water is added at the thickener — approximately the amount evaporated in the heat drying plant, giving a makeup rate of approximately 275 gpm. Overflow is piped to the plant for various uses. Underflow from the thickener goes to the two American Disc filters, Cake from the filters

can be sent to the flash dryers or can be diverted to refuse.

Dorr-Oliver can supply a full range of equipment for coal drying, cleaning, recovery and water clarification. For complete information write Dorr-Oliver Incorporated, Stamford, Connecticut.



American Disc Filter features extremely large filter area for space occupied.



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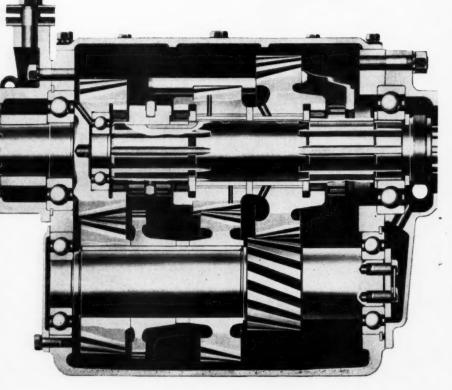
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High capacity

MODELS OF

- Widest range of ratios
- Low initial cost, less maintenance

- Optional topmounted power take-off
- Available from all leading truck manufacturers on specification



Specify the MODEL

3-SPEED

AUXILIARY TRANSMISSIONS

for YOUR job!

For MEDIUM-HEAVY DUTY, specify the Fuller 65 Series 3-speed Auxiliary

65 Series: Ratios

	SPLITTER	MATIOS.	REDUCTION
MODEL	High	Inter- mediate	Low
3-A-65	.754	1.00	2.221
3-8-65	. 804	1.00	1.239
3-C-65	.754	1.00	1.239
3-D-65	.804	1.00	2.221
3-E-65	.804	1.00	1.74
3-F-65	.754	1.00	1.74
3-G-65	1.00	1.32	2.221
3-H-65	1.00	1.32	1.74

For HEAVY DUTY, specify the Fuller 92 Series 3-speed Auxiliary

92 Series: Ratios

	SPLITTER	RATIOS .	DEEP REBUCTION
MODEL	High	Inter- mediate	Low
3-A-92	.74	1.00	2.09
3-B-92	.84	1.00	1.24
3-C-92	.75	1.00	2.64
3-D-92	.75	1.00	1.24
3-E-92	.84	1.00	2.09
3-F-92	.84	1.00	.2.64
3-G-92	1.00	1.327	2.09
3-H-92	1.00	1.327	2.64



P. S. Fuller also offers three heavy-duty 3-speed Auxiliaries with built-in high-torque power take-off. Ask your dealer about the Fuller 3-T-92 Series Auxiliaries.

FULLER

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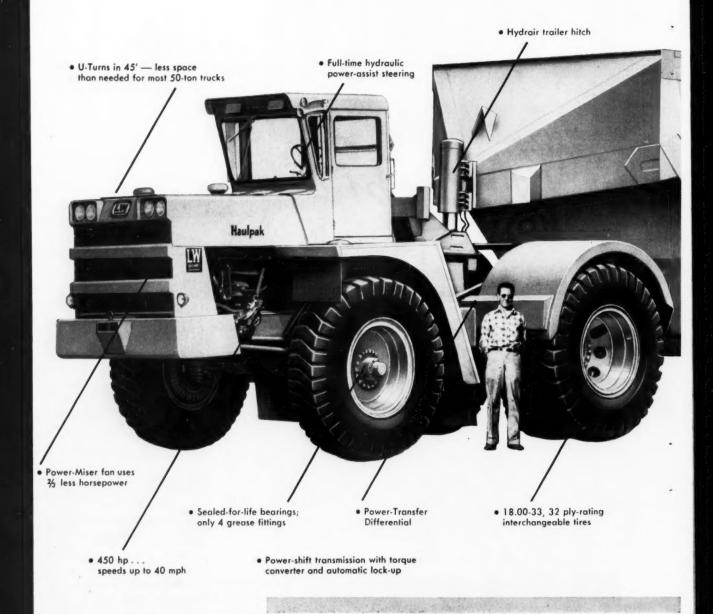
Subsidiary EATON Manufacturing Company

Unit Drop Forgo Div., Milwarkso 1, Wis. * Shuler Axle Co., Louisville, Ky. (Subsidiary) * Sales & Sorvice, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.

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In step with today's trend

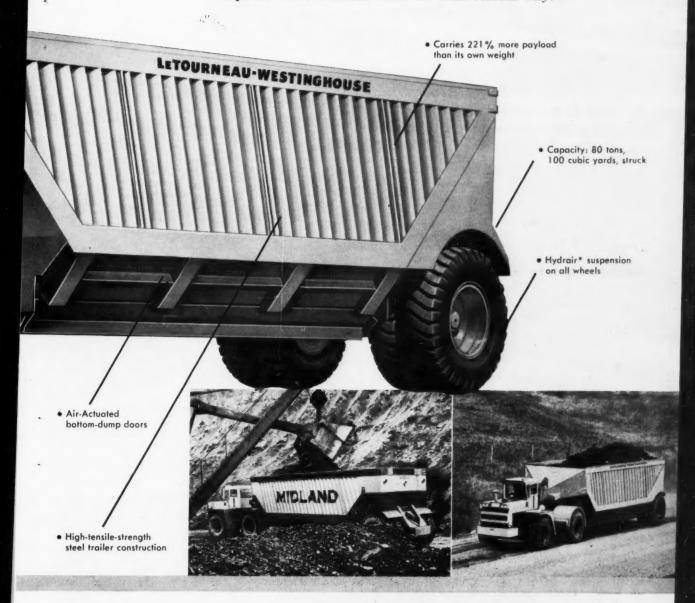
LW-80 Haulpak Coal Hauler moves more tonnage faster at lower net cost per ton



Contact your LW Distributor, or call the factory direct, at Peoria, Illinois. You will be put in touch with an LW specialist who knows the problems of hauling coal, and who knows coal-haulers. He will work with you and your engineers in determining whether this new concept in coal equipment can prove profitable for *your* operation.

to BIGGER equipment

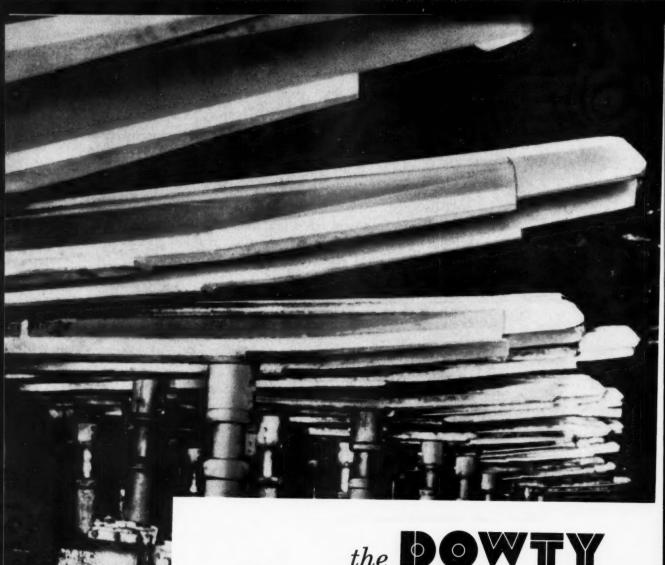
IF you're taking part in the industry-wide swing toward shovels and haulers of bigger capacity and higher horsepower, it will pay you to "go all the way" where haulers are concerned, and choose the LW Haulpak Coal Hauler. The reason for switching to BIGNESS is profitability, and the LW-80, new from the ground up, offers you more profitability than you may have expected from a hauler. Here are some reasons why:



LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

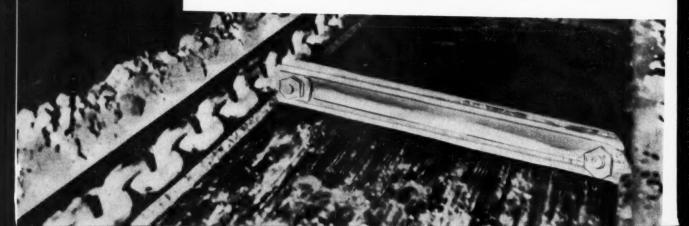
A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



Roofmaster

. now underground in Pennsylvania!



400 ft. longwall face mined with fully mechanized"push button" roof control system

The DOWTY Roofmaster is now making practical all the "theoretical" advantages of longwall mining . . . positive, continuous operations . . . no moving from place to place . . . concentration of output and haulage . . . simplicity of ventilation . . . high output per man and low cost per ton.

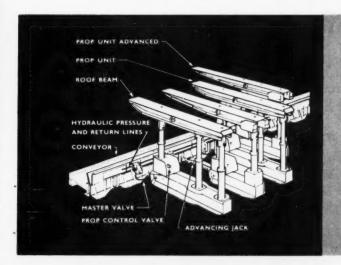
The new production-boosting Roofmaster system is now operating on a 400-ft. longwall coal face in Central Pennsylvania. It is a self-advancing, hydraulic-powered roof support system used with a shearer continuous miner and snaking conveyor.

With the Roofmaster system, all func-

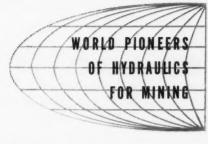
tions of roof control on the longwall face are performed by two men! The total face crew of five to seven men is expected to produce 600 or more tons of coal per shift on a 3½-ft. seam.

Conditions throughout bituminous areas are favorable for conversion to longwall with the DOWTY Roofmaster system. Greater production — greater safety — greater profits . . . these are the rich rewards attainable.

Skilled and experienced DOWTY engineers are available to survey the longwall potential of your mine, and provide comprehensive reports without obligation.



The DOWTY Roofmaster consists of self-advancing, hydraulic-powered double and triple-prop support units. Only two men are required for continuous operation of 200 support units.



DOWTY

M I N I N G L I M I T E D 90 Broad Street, N. Y. 4, N. Y. • Telephone Digby 4-6876 Ajax, Ontario, Canada • Telephone Whitehall 2-3100

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NOW! just two lubes underground!

(FOR ALL MAJOR LUBRICATION*)

One oil, one grease is all you need for all major mine lubrication with Texaco's new Simplified Lubrication Plan.

HERE ARE THE BENEFITS TO YOU!

Less money tied up in inventory. You only have to stock two lubricants.

Less lubricant contamination. Because fewer lubricants have to be stored near the working face. They are used up faster once opened and thus there is much less danger of contamination.

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Fewer purchase orders to write. Your purchasing expenses can drop significantly when you only have two lubes to order.

Lubricants cost less ordered in bulk. You can order larger quantities when you only use two lubes.

TALK TO YOUR TEXACO LUBRICATION ENGINEER

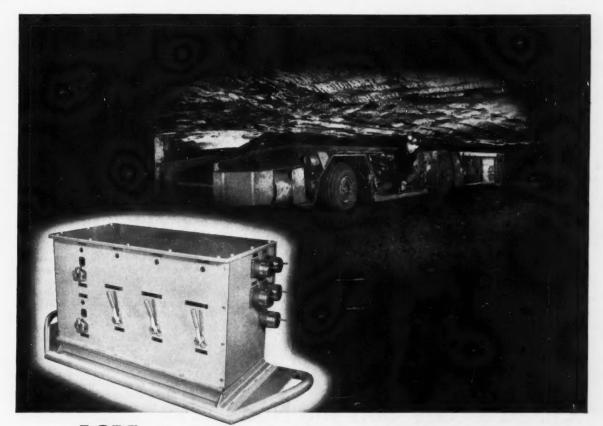
He can give you the details of Texaco's new money-saving Simplified Lubrication Plan. Just call the nearest of the more than 2,300 Texaco Distributing Plants or write Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

*Exception: Motor armatures require a second grease, but the amount is insignificant in terms of total lubricant requirements.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV



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FOR POWER DISTRIBUTION AT UTILIZATION VOLTAGES IN A.C. MINES

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Instantaneous power cut-off when trouble occurs:

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- Prevents dangerous cable fires
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Fast-acting circuit breakers coupled with these Joy "firsts":

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- Ground Fault Detector (GFD)
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Rugged skid-mounted units engineered to job requirements:

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- Facilitate moving, reduce down-time
- Individual circuit protection and fault isolation

CD 460-2

You can buy experience - at no added cost! When you specify Joy, you get the added bonus of Joy's total mining experience engineered into the equipment. Developed in 1946, Joy A.C. Safety Circuit Centers are serving reliably all over the mining world.

Available in both Permissible and Dust Resistant types for all standard operating voltages and frequencies.

Other Products of the Electrical Products Division



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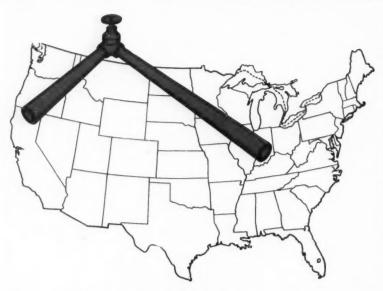


WRITE for FREE Bulletin SCC100 or contact your Joy engineer.

PRODUCTS

1205 Macklind Ave., St. Louis, Mo. Exec. Offices, Henry W. Oliver Bldg., Pgh., Pa.

News Roundup



Canadian Gas Gets the Nod

Four firms have plans okayed to draw natural gas from western Canada for transmission to the Midwest and West Coast in the U.S.

THE CANADIAN GOVERNMENT has approved the export to the United States of more than 1 billion cu ft of natural gas a day. By year end, the gas, mostly from the Alberta fields, should be streaming into the Midwest, and by 1961 into the Pacific Northwest and California.

Upon the recommendation of Canada's National Energy Board, the green light was flashed for two Americanowned companies and two Canadian companies, a fifth application being turned down. Successful applicants were Alberta & Southern Gas Co., Ltd., wholly-owned subsidiary of Pacific Gas & Electric Co.; Trans-Canada Pipe Lines, Ltd.; Westcoast Transmission Co., Ltd..; and Canadian-Montana Pipe Line Co., wholly-owned subsidiary of Montana Power Co. Rejected was the application of Niagara Gas Transmission, Ltd., subsidiary of Consumers' Gas Co. of Toronto, which had wanted to export 16.7 million cu ft of gas a day into New York State. The board found the company's proposed prices were too low to recapture capital and other costs.

Trans-Canada Pipe Lines, Ltd., will tap its 2,300-mi cross-Canada pipeline in the province of Manitoba, move 204 million cu ft a day for 20 yr to Midwestern Gas Transmission Co., subsidiary of Tennessee Gas Transmission Co., for transmission 504 mi to Marshfield, Wis. Customers for the gas will pick it up at this point and deliver it into the Chicago area via pipeline. Trans-Canada also received approval to export another 204 million cu ft to Tennessee Gas at the Niagara Falls boundary. But this would be on an interruptible basis and Trans-Canada expects to have little to supply after taking care of other customers.

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Alberta & Southern Gas Co., Ltd., will export 459 million cu ft daily through a 108-mi pipeline near Kingsgate, B. C., across the border from northern Idaho. Alberta & Southern's parent, Pacific Gas & Electric Co., plans a 1,400-mi line to move this gas to the San Francisco area.

Westcoast Transmission Co., Ltd., already shipping gas into the Pacific Northwest, received authority to use part of the Alberta & Southern complex to move an additional 152 million cu ft a day for 20 yr. It will deliver gas to El Paso Natural Gas Co. at an estimated 25,26c per thousand cu ft for the first year and 26.63c in the fifth year.

Canadian-Montana Pipeline Co. will buy gas from Alberta & Southern and sell it to the parent company, Montana Power, at Grand Falls, Mont., at the rate of 36 million cu ft a day for 25 yr. Prices are estimated by the firm at 22.63c per thousand for the first year and 24.96c in the fifth year.

Before the gas can flow to consumers a heavy capital spending program is necessary, involving costs for new pipelines alone of an estimated \$443 million. In Canada, some \$200 million will be spent for pipelines. This new surge of activity is expected to give a big lift to the Canadian economy. Estimated sales of gas to the U.S. by 1963 are put at about \$75.5 million.

Hit Change in Oil Import Quotas

The government boosted import levels for residual fuel oil 12 million barrels for the period, April to June. The new quotas were imposed despite strong attack from The National Coal Policy Conference, headed by Joseph Moody, and the National Coal Association, led by Stephen F. Dunn.

For the area east of the Rocky Mountains, the rise, announced by Secretary of the Interior Fred A. Seaton, sets maximum crude imports at 490,934 barrels daily, up from the previous 3-mo maximum of 425,000 barrels.

Mr. Seaton pinned the increase to higher-than-anticipated fuel demand, resulting from cold weather in March. He said the adjustment, in conjuction with about 18,250,000 barrels left as of March 31 from the original allocation, brings the total available for import in the second quarter to about 30,250,000

THESE MSA PRODUCTS HELP YOU FIGHT MINE FIRES INSTANTLY

M-S-A MINE FIRE HOSE is especially designed for rugged mine use. It's impervious to rot and vermin. Never needs drying. Lightweight. Easy to handle. Dated and branded for your protection.

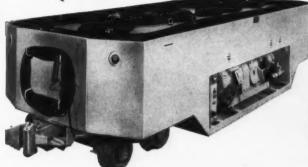
M-S-A BANTAM 400 ROCKDUST DISTRIBUTOR applies rockdust wet or dry. Availability of this machine in the working place, and the men's familiarity with its operation, make it ideal for fighting fires at their inception. Discharges dry dust through as much as 400 feet of hose at an average of 30 lb. per minute. Discharges wet dust at a rate

of 50 lb. per minute through 150 feet of hose.

M-S-A MODEL 1000 MINE FIRE TRUCK can be built to your specifications: as low as 26 inches, as wide as 7 feet. Capacities from 1000 to 1500 gallons. Discharge rate through 600 feet of M-S-A Mine Fire Hose is 50 gallons per minute at 50 psi.



M-S-A SLURRY ROCK DUST DISTRIBUTOR can pump a slurry of rockdust and water—the cheapest fire-fighting agents for mine fires—through as much as 1000 feet of hose at the rate of 120 lb. per minute.



M-S-A MODEL 2100 MINE FIRE TRUCK has 2100-gallon capacity. Discharge rate through 600 ft. of M-S-A Mine Fire Hose is 91 gallons per minute at 150 psi. Tank is fully baffled with triple weld construction. Truck is designed for easy maneuverability.

Any delay in fighting a fire may prove disastrous. Often, the sealing of an entire mine or section results. Such an operation is not only hazardous. It's costly.

This threat to human lives and vital mining equipment, however, can be greatly reduced. You can do it with one or more of the indispensable items described above.

A minimum investment in MSA fire-fighting equipment now, may save you thousands of dollars later. Write us for helpful literature.



MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pennsylvania

MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED
Toronto, Calgary, Edmonton, Montreal, Sydney, Vancouver, Winnipeg



Mr. Moody

barrels. This amount would be a bit above imports in the second quarter of 1957, the base year of the control program.

Tough Stand—Mr. Moody voiced vigorous complaints against what he termed "sabotage" of the residual oil imports program. He called for a probe by Congress and the Interior Dept. of efforts by Standard Oil Co. of New Jersey and a few other major residual-oil importers to wreck the President's security measure.

"Now it would appear from information available to the public . . . that the three largest importers, Standard Oil Co. of N.J., Texaco, Inc., and Hess, Inc., have used up in the first two months of the 6-mo period the preponderant fraction of their quota," Mr. Moody wrote to Secretary Seaton. "Jersey Standard had imported all but 30% of its allocation with 4 mo yet to go in the period; Texaco, Inc., owner of Paragon Oil Co., the second largest importer, had 42.2% left and Hess, Inc., the third largest, 38.4% yet to bring in," he said, attributing his information to a Journal of Commerce article.

He warned that if the department bowed to the demands of a few major importers it would be a "catastrophic blow" to the American citizens who depend on the coal industry, as well as to millions of others concerned with the economic well-being of all our domestic fuel and transportation economy.

NCA-Stephen Dunn, president of NCA, concurred with Mr. Moody in his analysis of the imports situation and asked interested parties to intervene with their senators and congressmen "for support of a position that could well be a deciding factor as to whether a government policy is going to be dictated by government officials or by officials of a few major oil importing companies."

Cuts Sulfur

Bituminous Coal Research, Inc., reports good results in its work on reducing sulfur in bituminous coals.

The research program, sponsored by the electric utility and coal industry, has two parts: pyrite separation from coal; and sulfur dioxide removal from flue gases.

Ultimate goal is to significantly reduce atmospheric contaminants in flue gases. The project reflects the spreading air-pollution problem in this nation. It is hoped BCR's work will be of major significance to the steel, chemical and general manufacturing industries which burn coal or use it as a raw material.

Working with five high-sulfur coals, BCR researchers have been able to liberate large amounts of pyritic sulfur from the samples. It is now believed that an effective process for reducing sulfur content in bituminous coal may follow.

The Joint Research Advisory Committee, guiding the program, has urged more advanced work, stating technical progress achieved to date on pyrite separation indicates that development of commercial equipment for economically separating pyritic sulfur from coal seems feasible.

This Means Coal

The National Electrical Manufacturers Association predicts the number of electrically-heated homes will rise from today's 850,000 to 6 million by 1970.

C. F. Kreiser, chairman of NEMA's
(Continued on p 48)



MOTOR VESSEL, John H. Elliott, named for United States Steel Corp.'s vice president, production services, heads up the Monongahela River toward the firm's Robena coal-preparation plant after christening ceremonies at Clairton, Pa. The 118-ft boat has a 27-ft beam and a hull measuring 8 ft 6 in in depth. It is powered by two turbo-charged diesel engines developing 533 hp at 750 rpm. The Elliott will take a place in a towboat fleet to haul coal for Clairton Works.

Bureau of Mines Speaks On Mobile Nitrate Mixers

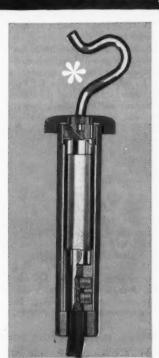
ONE OF THE RECENT ENTRIES in our Operating Ideas department (March, 1960, p 136) described the use of truck-mounted 5-cu yd concrete mixers for preparing and handling ammonium nitrate-fuel oil blasting agents. M. J. Ankeny, director, U. S. Bureau of Mines, in a letter to the editor, writes that both the title and the text of the article seem to favor the use of mobile concrete mixers for this purpose.

Mr. Ankeny continues:

"The Bureau of Mines recognizes both inherent advantages and inherent hazards in such use of mobile concrete mixers. A considerable degree of confinement to the sensitized ammonium nitrate is provided by the mixing drum, especially when it is closed, as in transit. We believe that this introduces a definite hazard. For example, if one of these units became involved in a fire due to highway accident or other causes, the combination of heat and confinement could lead to a disastrous detonation.

"Based on presently available knowledge, we believe that such mobile units should not be used for mixing or transporting these blasting agents on public roads."

O-B Designs for Mining Men **RESULT:** A safe, quick power-connection



for portable equipment in fast mining operations.

O-B FUSED TAP HOOKS UP FAST with a wide selection of contacts—hook, clamp, plier-type or other standard types. The O-B unit will allow you to put power to work . . . quickly and safely . . . right where you need it!

PROTECTS MEN AND EQUIPMENT... cuts power off the line when trouble occurs. Sturdy, explosion-resistant case safely isolates mechanical and electrical impact of circuit breaking. Top-mounted release vent protects the operator.

FOLLOWS FAST MINING OPERATIONS. Almost as easily as plugging in a light in your home, you snap on your ground-clamp . . . put your equipment to work in a new place simply by hanging this handy unit on the line.

Save safely . . . with this fused power-tap from O-B. See your local O-B representative for further information and prices or write us now. Оню BRASS COMPANY, MANSFIELD, OHIO. Canadian Ohio Brass Company, Ltd., Niagara Falls, Ontario.

Ohio Brass

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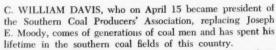
EXPANSION SHELLS AND PLUSS . LINE MATERIALS . SAPETY AND CONTROL EQUIPMENT . ELECTRIC HAVLAGE MATERIALS

10046-M

People in Coal



Appointed SCP President



Born in Wind Rock, Tenn., Mr. Davis was educated in Tennessee public schools. Graduating from Jellico High School in 1934, he worked in Tennessee coal mines before entering the armed forces to serve with the 245th Battalion, Field Artillery, Fifth Army, in Africa and Italy during World War II.

After leaving the service, he entered the University of Tennessee College of Law, graduating in 1948 with an LL.B. At the university, he became a member of the honorary law fraternity, Phi Delta Phi.

Mr. Davis has had thorough preparation for his new post. While attending the university, he served as understudy to the president of the Southern Appalachian Coal Operators' Association and in Jan., 1951, took over the post of secretary of Southern Appalachian.

From that assignment, he accepted the executive secretary position of the Big Sandy-Elkhorn Coal Operators' Association, Pikeville, Ky. Six years later, he became executive secretary of the Bituminous Coal Operators' Association, with head-quarters in Washington, D. C., a post he has held since July 1958.

Mr. Davis married Miss Jean Sager in 1944. They have two sons, Charles William, 12 and David Edward, 3. They live in North Arlington, Va.



Clinton Carl Cornelius has been named vice president of engineering for Emerald Coal and Coke Company, a J. H. Hillman & Sons Co. subsidiary. Mr. Cornelius was formerly located at Salt Lake City, Utah, as general manager, United States Fuel Co. Prior thereto, he was with Baton Coal Co. of Pittsburgh for nearly 10 yr as assistant chief engineer, general superintendent and vice president of operations, Before that, he was employed by the Pittsburgh Coal Co.

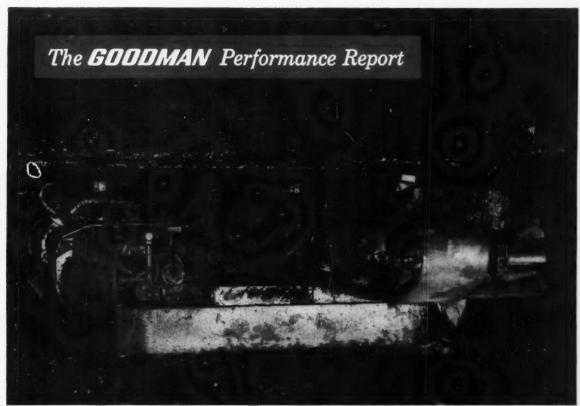
Harry F. Weisehahn, who has been on the local headquarters staff of the Bituminous Coal Institute, has relocated in Nashville, Tenn., to open a district office there for the National Coal Association. Mr. Weisehahn, a native of Indiana, is a Purdue University graduate with a degree in electrical engineering. Before joining BCI, which is now a department of NCA's Marketing Div., Mr. Weisehahn was a boiler and equipment sales representative.



Charles B. Lakin, Wayne, Pa., has been elected executive vice president and chief executive officer, The Berwind-White Coal Mining Co. Mr. Lakin also was elected to the same position in New River & Pocahontas Consolidated Coal Co., and Kentland-Elkhorn Coal Co., affiliates of Berwind-White. He is a 1930 graduate of Harvard University, holding an AB, as well as an M.B.A. Joining Berwind-White in 1932, he remained there until 1943, when he enlisted in the U.S. Army. He rose to the rank of First Lieutenant, and rejoined Berwind-White after discharge, in 1946. He has been a vice president since 1956.

The Berwind-White Coal Mining Co. announced other organizational changes. Charles E. Dunlap and Charles G. Berwind, president and vice president, respectively, have retired from those positions. Mr. Dunlap will be chairman of the board and Mr. Berwind a director. Edward J. Behn and Charles G. Berwind Jr. were named vice presidents of the company and its affiliates. Zeb H. Herndon was elected vice presidentlands, of the New River & Pocahontas Consolidated Coal Co. Leroy A. French was named assistant vice president and Robert H. Seese, general manager, for the firm.

Lewis E. Evans has become the new acting secretary of mines for the Commonwealth of Pennsylvania, following his designation by Governor David L. Lawrence. On confirmation by the state senate, he will become secretary of mines. Mr. Evans, previously deputy secretary, replaces Joseph T. Kennedy, president, UMWA, who resigned Friday, April I. A resident of Ebensburg, Pa., the new secretary has been widely rec-



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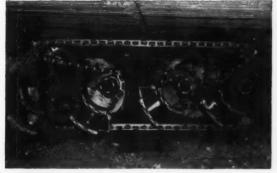
How to make development pay off

They moved in—worked 27 consecutive day and night shifts—efficient, 5 man crews and one Goodman 300 Continuous Borer. All in solid work in 63" coal. It paid off! They advanced 5,578 feet (206.5 feet per shift) and mined 16,734 tons (3 tons per foot). This is an average of 619.7 tons per shift and 123.9 tons per shift per man. The borer was serviced by a Goodman loader and two shuttle cars.

Variation in seam height was no problem because the 300's cutting height can be adjusted while operating...full range of adjustment is from 48" to 66". Also, as development work reaches planned limits, the maneuverability and capacity of the 300 will be utilized in full production work including pillar recovery.

Let your Goodman Sales Engineer give you the complete story of this full-face mining, continuous borer. Ask him to arrange for you to see it in action.





The 300 cuts a 13'-10'' wide path at 48'' and a 14'-10'' path at 66''. Bottom is flat for good roadway.

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MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES . CONVEYORS . LOADERS
SHUTTLE CARS . LOCOMOTIVES . CONTINUOUS MINERS

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CMI. CMI. C for action, economy and compact operation



This compact CMI Dryer was designed and built to fit jobs of moderate proportion (up to 20 tph) . . . whether to dry coal or minerals to less than 5% surface moisture . . . to keep coal or minerals from freezing . . . or to recover coal or minerals from slurry ponds.

Model 26 is the ideal centrifuge where space or head room is limited, where production is less than 20 tph and where trouble and down-time free, economical and continuous operation are desired.

The CMI Model 26 is the smallest and most compact centrifugal dryer in the CMI line of dryers in operation in hundreds of installations in leading industries throughout the world.

the CMI model 26 CONTINUOUS CENTRIFUGAL DRYER

FOR COMPLETE DETAILS ABOUT THE CMI MODEL 26, WRITE OR WIRE.

CENTRIFUGAL AND MECHANICAL INDUSTRIES INCORPORATED

CMI

146 President Street . St. Louis 18, Missouri



We rupture our plastic pipe so yours won't

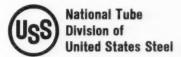
This explosion marks the end of the short but useful life of a piece of USS National Polyethylene Pipe. We deliberately burst it during a test with pressure that would greatly exceed the strain of normal service.

The length of Polyethylene Pipe was submerged in heated water; then more water was forced into the pipe until it burst. The pressure was much greater than specifications. Tests like this prove to us that the Polyethylene Pipe we make is more than strong enough for use in your mine drainage applications.

USS National Polyethylene Pipe is unaffected by corrosive mine water, acids, alkalies, salts and other mine chemicals. It eliminates the need for replacement pipe, because it's made to last. Polyethylene Pipe has a temperature range of -90° F. to $+120^{\circ}$ F., and it won't crack or break in sub-zero weather.

USS National Polyethylene Pipe is available in sizes from ½ inch to 6 inches in diameter, and in a variety of wall thicknesses. It's light, flexible and easy to handle. For information, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and National are registered trademarks





Bit illustrated: CCS-2



Auger Bit—Tipped with the finest carbide made—for longer tool life . . . "V" prong for faster penetration. (Square and Hex shapk.)



CC-8 STYLE

Machine Bit—Negative Rake, stronger cutting edge . . . tip, in compression, with greater support utilizes maximum carbide strength . . . fewer bit changes.

Proved uniform quality, mine engineered, more grinds per bit, more tonnage per dollar

Can you afford to gamble on anything but first quality bits? Consider the big investment in your drills, continuous miners, etc. Stack the cost of any one of these pieces of equipment against the cost of teeth that do the cutting. The odds are big in favor of the finest quality bits. That is the reason so many operators are making replacements with Carboloy mining tools . . . the silver-colored bits. Your Carboloy Mining Tool Distributor has them for immediate delivery. If not, write or phone Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Ave., Detroit 32, Michigan.



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Harlan—Kentucky Mine Supply Co., Inc. Lothair—Speck Cornett Distributor, Inc. Madisonville—Pickard Industries, Inc., Central Mine Supply Div. Paintsville—Farmers Supply Co. Pikeville—Big Sandy Electric & Supply Co.

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TEXAS

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Charleston—Rish Equipment Company
Clarksburg—Rish Equipment Company
Fairmont—Fairmont Supply Company
Montgomery—Marathon Coal Bit Company,
Inc.

Shinnston-Erwin Supply Company

People in Coal (Continued)

ognized as an expert in both the anthracite and bituminous fields. The governor mentioned that Mr. Evans was recommended for the job by Mr. Kennedy. In 1936, Mr. Evans became a member of the UMW District No. 2 executive board, He remained in that post except for armed forces service, until appointed deputy secretary of mines in 1955.



William G. Stevenson has been named vice president of operations, Emerald Coal and Coke Co., a subsidiary of J. H. Hillman & Sons Co. Mr. Stevenson, formerly general manager of mines, has spent his entire business career of more than 37 yr with J. H. Hillman & Sons and its affiliated companies. Since joining the firm in 1922, he has held a variety of positions including assistant division superintendent and division general superintendent. Among Mr. Stevenson's professional affiliations are membership in the Engineers Society of Western Pennsylvania, Coal Mining Institute of America, Pittsburgh Coal Mining Institute, Western Pennsylvania Coal Operators Association and the National Mine Rescue Association.

H. O. Zimmerman, manager of coal properties, Inland Steel Co., Wheelwright, Ky., has been elected a division chairman for the Coal Div. of The Society of Mining Engineers, AIME.

Obituaries

Daniel Harrington, retired 12 yr ago as chief of the Bureau of Mines Health and Safety Div., died at the age of 81. Mr. Harrington, born in Denver, Colo., received a degree in mining engineering in 1900 and worked as an engineer and mine superintendent for various coal companies until he joined the bureau in 1914.



Armstrong Robertson Matthews, 57 president, Consolidation Coal Co., died suddenly in Honolulu April 2, after bathing and canoeing. Born in Nashville, Tenn., Mr. Matthews graduated from Montgomery-Bell Academy, Nashville, in 1920. He attended Vanderbilt University from 1920 to 1921, then went on to Lehigh University, graduating in 1925 with an engineer of mines degree.

After school, he accepted a position with Tennessee Consolidated Coal Co., as head of its engineering projects. Shortly afterwards, he was employed by Inland Collieries Co., for special duties. In 1928, Mr. Matthews joined Consolidation Coal, at Fairmont, W. Va., where he worked on the engineering staff for 3 yr. In 1929 he transferred to the Operating Dept. of Consol, becoming successively division superintendent of the firm's Pocahontas-New River Div., and the Fairmont Div.

From 1933 to 1935 he was on the engineering staff of the Philadelphia & Reading Coal & Iron Co., Pottsville, Pa. He was manager of operations and later vice president of Clover Splint Coal Co., Harlan County, Ky., from 1935 to 1944. From 1944 to 1951 he was with Clinchfield Coal Corp., Dante, Va., first as executive vice president, and from 1946 as president.

On Nov. 1, 1951, Mr. Matthews became president of Pocahontas Fuel Co., Inc., Pocahontas, Va., holding that position until Dec. 18, 1956 at which time a merger between Pocahontas Fuel and Pittsburgh Consolidation Coal Co. became effective. He was named president of the combined firms, which was then renamed Consolidation Coal Co.

A member of Sigma Chi fraternity and AIME as well as numerous other industrial committees and professional organizations, Mr. Matthews was married to Elizabeth Sampson, June 10, 1937. They lived in Pittsburgh, where he was active in numerous church and community affairs. Mrs. Matthews survives him.



Dravo-3200 towboat "Northern" gives outstanding performance in Mississippi River service...

The tow illustrated is a good example. The *Northern* pushed this 33-barge 17,840 cargo-ton tow 231 miles from Cairo to Memphis in 28 hours and 45 minutes, including some slowdown for refueling en route.

The superior operating efficiency of the *Northern* and all Dravo-3200's is the result of Dravo's *Precision-Balanced Propulsion*. Operator after operator has reported that the PBP design gives them exceptional towing performance and unusually low ton-mile cost. It can do the same for you. For details, contact Marine Department, Dravo Corporation, Pittsburgh 25, Pa.; SPalding 1-1200.

TWO DRAVO-3200'S ARE NOW BEING BUILT

— AVAILABLE FOR EARLY DELIVERY





BALANCED COMPOUNDING means BALANCED RESISTANCE

... to all of the factors that attack portable cables and cords



It is not enough that portable cables or cords have the ability to resist attacks by water or oil, or any other single factor. To provide truly dependable service over long periods of time, portable cables must have balanced resistance to all deteriorating factors.

Since there is no one ingredient that has inherent resistance to all of these factors, the insulation or jacket of the portable cable or cord must be a combination of ingredients.

Balanced Compounding refers to the scientific selection of these ingredients and the proportions in which they are mixed. Where the balance is upset by loading the compound with any one ingredient, resistance to one factor may increase, but resistance to other factors will be lessened.

Proof of the worth of Simplex Balanced Compounding can be found in the fact that Tirex portable cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.



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You get good service from the bits and the company. The salesmen are always on the job to take care of your needs. The bits last twice as long as any other we've ever used.

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MINING TOOL DIVISION
Bedford, Pennsylvania

Coal Abroad

Seeking A Unified Energy Policy

European community coal producers talk up a policy that would ensure fair competition among all forms of energy.

Coal producers of the six-nation European Coal & Steel Community have come out for a unified European energy policy that would apply the same rules to coal, oil and natural gas, in order to ensure fair competition among all.

At the same time, the coal men advocate a series of measures to straighten out the competitive situation between coal and oil. These measures include setting a consumption tax as well as quotas on imported crude and its products, and revision of government tax policies, with taxes on gasoline.

The plan was conceived by a committee of French, German, Belgian and Dutch coal producers. These nations have been experiencing growing competition between the various energy sources, with coal seemingly getting the worst of things to date. The aim of such an energy policy, the committee noted, would be to eliminate present distortions in the competitive position of European coal, compared to imported coal, oil and gas.

The group asked for a common sixnation import policy, coordination of taxes on different types of energy within each country, and fair transport charges for each fuel. It recommended publication and observance of prices, and suggested that new forms of energy, such as Sahara gas and nuclear energy, be introduced gradually.

EAST GERMANY-The Brikett-Fabrik West, East Germany's biggest bituminous coal-processing plant, has been completed. It is the first stage of a huge brown-coal combine called "Black Pump," near Cottbus, East-Germany. The plant is scheduled to supply 17.5 billion cu ft of gas derived from brown coal to all parts of the communist sector of Germany, by 1963. Another project within the scheme calls for construction of a 116.5-billion cu-ft-a-year pressure plant. The East German government says it invested \$86 million in 1959 for browncoal-mining activities.

INDIA—A large group of Soviet engineers are going to India to present their plan for development of a new coal field in Korba. The field would have an annual output of 4 million tons. The proposal calls for building a strip mine, coal-washing plant, two pits and electromechanical shops. The coal will fuel railways and a new power station.

BRITAIN—The government in this nation has promised to give "urgent" consideration to proposals on the future of imported methane gas. The seventh cargo of liquid methane recently entered Britain from the United States and English coal producers have become increasingly edgy over the trend. The government has said that methane imports would not be to the disadvantage of the coal industry, but British coal producers, with big stockpiles and ailing markets, are not convinced.

ECSC-European Coal & Steel Community coal output in March amounted to 20,990,000 metric tons against 19,670,000 in February, and 19,881,000 tons in

coal-processing plant, has been



Now you can weld rail joints Easily— Quickly— Cheaply!

Thermit Welding is now the simplest and speediest of all rail welding methods — just line up rail ends, fasten on a pair of molds, pour in and ignite the Thermit, and, move on to the next joint. Five or six minutes is all it takes to make a strong, sound weld that will stand up indefinitely in main haulage track; always have 100% conductivity. With modern Thermit Welding, no time is lost in preheating rail ends prior to welding — there's no heavy equipment to haul into the mine. Materials come in "Self-Weld" kits, each kit containing everything needed to make one weld. And, the cost is amazingly low—compares favorably with that of bolted joints with bonds. Write for more information.

THERMIT Rail WELDING

Thermex Metallurgical, Inc., Lakehurst, New Jersey

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EXPERIENCE show you the Simple, Low Cost Way to Clean Up Your Water System... Eliminate Plant Bleed and Water Pollution

DENVER FINE COAL RECOVERY SYSTEMS

are engineered to handle large volumes of dilute pulp (10% solids or less of -20 x 0 fines) with maximum recovery of low ash, marketable coal fines at lowest cost for added profits...in addition to cleaning up your water system...eliminating plant bleed and resultant stream pollution...and extending the life of your impounding area for refuse.

Use DENVER Testing Service to determine...

- (A) Flotation conditions and reagents
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- (C) Refuse thickening
- (D) Flocculating aids
- (E) Refuse filtering characteristics
- (F) Water recovery and clarity

These tests can assist you by supplying reliable data on your flotation, settling and filtering needs. Only a 5 gallon slurry sample is required to conduct such a test.

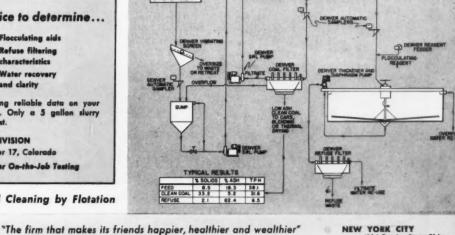
DENVER TESTING DIVISION

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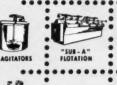
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75,000,000 BUTT-WELDED RAIL BONDS* they must be good!

question:

What is the best method of attaching a flexible strand to a solid end piece so that the connection will have both the highest electrical conductivity and the greatest mechanical strength?

possibilities:

Soldering, drop forging, cold pressing, brazing, flame welding, or butt welding.

answer:

Butt Welding! Only with machine butt welding can consistent electrical and mechanical results be obtained with clock-like regularity. Only with butt welding can you be sure that in every case all the wires in the strand are electrically connected permanently to the solid end piece. Only butt welding will consistently develop full strength of the strand on a tensile test to destruction. The butt weld is stronger than the strand!

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USS and Tigerweld are registered trademarks



*Covered by Patent Numbers 2,008,786-2,008,787-2,023,317-2,213,990.



American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors Tennessee Coal & Iron Bivision, Fairfield, Ala., Southern Distributors United States Steel Export Company, Distributors Abroad

Coal Abroad (Continued)



BACK from Coalbrook, Orange Free State, South Africa, is Paul Weir, of Paul Weir Co., Inc. Mr. Weir, a mining consultant, was engaged by Clydesdale Collieries, Ltd., to investigate probable causes of a cave-in which occurred Jan. 21, 1960, at one of the companies mines, taking the lives of 436 men. He and Sir Andrew Bryan, British coal mining authority, also called in, agreed that the disaster at the North Colliery was caused by an unprecedented fracture of the overlying strata, resulting in the collapse of an area of mine workings about 1,000 acres in extent. No accident of a similar nature had ever occurred in this coal field. Mr. Weir is past chairman of the Coal Div. of the AIME and an Erskine Ramsay gold medallist.

ECSC (from p 38)

March, 1959. There was a tendency for stocks to increase slightly in the first weeks of the month.

HOLLAND—In 1959 a total of 7,506,096 tons of coal were mined in the four coal mines of the Netherland's state mines, over 45,000 tons less than in the preceding year. The daily output per manshift, however, increased to 3,786 lb of coal from 3,540 lb in 1958. The state mines accounted for 62.7% of the total net coal production of all Dutch coal mines, which was 11,978,190 tons. Nearly half of the coal produced by the state mines was processed to 2,843,661 tons of coke by two coking plants.

ENGLAND – Ford Motor Co., Ltd., ordered a three-point \$5 million coal-fired boiler for an extension to its boiler house at Dagenham, Essex, The move by the company has been hailed by Britain's National Coal Board as a triumph for coal. Ford Motor had considered and rejected the possibility of producing low-pressure steam from atomic reactors.



WHICH IS BEST 3 new series Cat Motor Graders

NEW

No. 12 Series E 115 HP

NEW

No. 112 Series F 100 HP

NEW

No. 112 Series E 85 HP

for higher production, easier servicing and long life!

No machine is better than its engine—and the new Cat Diesel Engines in these three new series Motor Graders are better than ever. They're more compact, more rugged and modern in design. They incorporate the latest developments in metallurgy and technology. They provide three important bonuses—greater lugging ability in tough going, easier servicing and long life.

A COMPLETE LINE-85 HP to 150 HP

The new Turbocharged 100 HP No. 112F is designed for high production to match work requirements between the new 85 HP No. 112E and new 115 HP No. 12E. Compared with the 85 HP model, the 100 HP machine delivers 5% higher travel speeds and a 5% increase in blade speed control. With its introduction into the line, Caterpillar now offers you a choice of four Motor Graders in all to meet your specific requirements. The largest is the Turbocharged 150 HP No. 14, the most versatile big grader ever developed.

SEE YOUR CATERPILLAR DEALER

Some of the features of the new Cat Motor Graders are described briefly here. But for the complete picture, see your Caterpillar Dealer. Ask him to show you how they're a better buy for your money than ever. Take a look under the hoods at the new modern-design engines. Better still, ask for a demonstration.

See how they "pull through" tough going. Caterpillar Tractor Co., General Offices, Peoria, Ill.

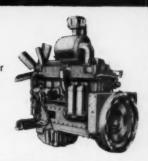
CATERPILLAR Catarpillar and Cut are Registered Tradomarks of Cotarpillar Tractor Co.



FOR YOUR JOB? with new compact engines!



New No. 12E Motor Grader features new compact 115 HP Engine





New No. 112E Motor Grader features new compact 85 HP Engine

The new No. 112F is similar in appearance, but features a Turbocharged 100 HP Engine.



NEW HIGH TORQUE. Though the engines in the new Cat Motor Graders are designed specifically for each machine, they all develop higher torque than previous models and have other basic improvements in common. For example: shorter, stiffer blocks and crankshafts...stronger, distortion-resistant cylinder heads... improved cooling systems with greater capacity...engine lubricating oil conditioning...and advanced design fuel systems

-new, compact fuel injection pumps with barrel and plunger assemblies in easyto-service pump housings.

NEW STARTING ENGINE. Now standard is a new two-cylinder, vertical starting engine to replace the horizontal engine. All three Motor Graders use a modern 12-volt electric system. An optional 24-volt system is available for use in moderate climates where direct electric starting is practical.

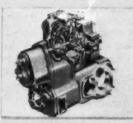
PERFORMANCE-PROVED FEATURES. While many advances have been designed into the compact new engines, certain time-tested features have been retained. To mention a few: precombustion chamber design that delivers maximum horse-power on heavy, economy-type fuels... steel-back aluminum bearings... wettype "Hi-Electro" hardened cylinder liners... and aluminum pistons with

cast-in ring band.

OTHER HIGH-PRODUCTION FEATURES IN CAT MOTOR GRADERS



NEW DRY-TYPE AIR CLEANER (standard) removes a minimum of 99.8% of all dirt from intake air during every service hour. Can be serviced in 5 minutes. Cuts your maintenance time by as much as 70% and substantially reduces maintenance costs. Cleaner air atso extends engine life.



EXCLUSIVE OIL CLUTCH (standard) provides up to 2000 hours service without adjustment, the equivalent of about 12 months of "adjustment-free" operation. A Caterpiliar development proved by millions of hours of use, it virtually eliminates down time for clutch repair.



AUTOMATIC BLADE CONTROL (optiunal) cuts grading time in half. Operator sets desired slope on dial and only has to control depth of cut. Manufactured by Preco Incorporated, the unit automatically maintains blade slope within ½" in 10'. Available factory installed.



IN-SEAT STARTING (standard) offers operator finger-tip convenience and positive starts in any weather. Another feature: improved mechanical blade controls provide precise adjustment and ease of engagement. "Anti-creep" lock makes blade stay put under load.



introduces revolutionary "Plasticoal"

The first and only PVC yarn-dipped, fully impregnated, double-woven coal mine belt with durability more than skin deep

All the disadvantages of short life, slippage, stretching and rotting of conventional light-weight coal mine belts have been overcome by the revolutionary Thermoid-Quaker "Plasticoal" belt.

In contrast to conventional double-woven cotton fabric covered with neoprene, new "Plasticoal" is impregnated through and through with Polyvinyl Chloride . . . even the yarn is PVC dipped before it is woven. Nylon cords are added, in both directions, to provide extra strength and the entire impregnated carcass is heat-set under tension before the final dip and heat-set.

For underground mine safety, USBM 28-11 "Plasticoal"

is flame retardant and flame resistant. It's lighter in weight and more flexible for ease of handling underground. The rough surfaces give better material traction, less slippage, yet require less tension. And being completely impregnated with PVC, the "Plasticoal" carcass carries the load long after the cover is worn away. Even extreme edge wear will not put "Plasticoal" out of commission.

Mine-orange "Plasticoal" is available from stock in 26", 30" and 36" widths, up to 600' lengths or longer on request. See your Thermoid Division Distributor for all the advantages of new "Plasticoal." Or write Thermoid Division, H. K. Porter Company, Inc., 200 Whitehead Road, Trenton 6, New Jersey.

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PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Equipment Approvals

Manson Machine Co.—No. 512 Goodman shortwall cutting machine; one motor, 50 hp, 440 V, AC. Approval No. 2F-1540A, March 2.

Lee-Norse Co. — Model KMC-43B Koal mobile shuttle-cer; five motors, three 5 hp, two 3 hp, 230 V, DC. Approval No. 2F-1541, March 7.

Getman Bros.—Model KD-2 diesel ore carrier with Deutz Model F2L712 air-cooled diesel engine for use in noncoal mines. Approval No. 2F-1541, March 7.

Ensign Electric & Mfg. Co.—Distribution box; 150 amp, 440 V, AC. Approval No. 2F-1542A, March 15.

The Jeffrey Mfg. Co.—Type MM-100A rope-propelled miner; one motor, 50 hp, 250 V, DC. Approval No. 2F-1543, March 16.

Mountaineer Coal Co. — Rock-dust distributor; one motor, 5 hp, 440 V, AC. Approval No. 2F-1544A, March 18.

Director, Bureau of Mines — Type A-1 dust sampler; Approval No. 2F-1545, March 22.

Joy Mfg. Co. — Type 18SC5PBF/-PBXF-3 shuttle-car; four motors, two 15 hp, two 10 hp, 500 V, DC. Approval No. 2-1331 A, March 23. Approval No. 2-1331 for 250-V, DC, 18SC1PE/PXE-1 shuttle-car also issued to Joy.

Joy Mfg. Co.—Type 14BU10-2BHH loading machine; seven motors, six 20 hp and one 6 hp, 415 V, AC. Approval No. 2F-1546A, March 28.

Goodman Mfg. Co. — Type 9678 tractor-tread loader; four motors, each 21 hp, 250 V, DC. Approval No. 2-1511, March 28. Approval No. 2-1511A for 500-V, DC, 9678 loader also issued to Goodman.

Director, Bureau of Mines — Type A03 miniature methane-indicating detector. Approval No. 8C-14, March 31

Coming in July

Coal Age readers will receive their annual issue of the Mining Guidebook and Buying Directory in July. You will find this issue useful throughout the year as a reference book on up-to-date mining practices and equipment and as a source of information on names ad locations of manufacturers. You will also get the regular issue with all sections.



CUT FASTENER APPLICATION TIME IN HALF BY USING THE NEW . . .

- FLEXCO SPEED TOOLS with an impact wrench.
- FAR-PUL BELT CLAMPS—the easiest, quickest way to pull belt ends together.
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- EASY "CLIP" METHOD newly designed clips hold fasteners in correct position while nuts are being run down — no other alignment tool required (clips included with every carton joint).

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Complete splices of 500X and 250X fasteners for any given width of belt available in cartons (carton includes pins, bolts, nuts and clips).

ORDER FROM YOUR DISTRIBUTOR, or write for bulletin 500X.

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We've used Kennametal bits in our mines for quite a number of years and they have proven so satisfactory that we won't use any other make.

KENNAMETAL Inc.

MINING TOOL DIVISION
Bedford, Pennsylvania

Current Coal Patents

By: Oliver S. North

Cyclone Separator, D. H. Fenske and R. T. Sorensen (assigned to International Minerals & Chemicals Corp., Chicago, Ill.), Mar. 22, 1960. Design for a cyclone separator for concentrating minerals from gangeu where one constituent is markedly different from the others in one or more of its physical characteristics, for the recovery of fine coal from slate particles. No. 2,929,501.

Process for the thermal decomposition of sulfuric acid sludges, H. Miley, H. Sonneborn III and F. W. Breth (assigned to L. Sonneborn Sons, Inc. Del.), Mar. 22, 1960. In a method for decomposing sulfuric acid alkylation sludges derived from the treatment of hydrocarbons, 5 to 25% of pulverized bituminous coal is mixed with the sludge prior to addition of the coke fraction. When coal is thus added, an improved dry granular coke is produced as the residue of the process. No. 2,929,684.

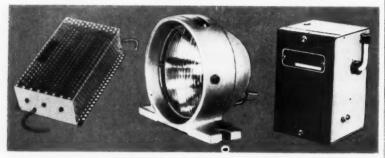
Charging blast holes with explosive, G. H. Smith and W. J. Mitchell (assigned to Union Carbide Corp., New

York), Mar. 29, 1960. Method for charging blast holes with LOX explosives wherein no mixing of the combustible material and liquid oxygen is effected prior to introduction into the hole. An elongated inflatable bag of burlap-encased polyethylene terephthalate plastic, is lowered into the hole and a small tube carrying detonating means is inserted and the bag inflated. The required amount of carbon or other combustible material is blown into the bag around the tube, and the remainder of the bag stemmed. LOX is introduced through the tube. Alternatively, the carbon and stemming may be "deck loaded" (charged in alternate layers). A hole loaded in this manner can be safely left for long periods before shooting. No. 2,930,276.

Apparatus for the gasification of solid fuels, D. B. Eastman (assigned to Texaco Inc., Del.), Apr. 5, 1960. Process for production of carbon monoxide and hydrogen from anthracite or bituminous coals or lignite, and the like, by the interaction under pressure of the pulverized feed material with a mixture of oxygen and steam. No. 2,931,715.

Guyan

HEADLIGHT RESISTORS SEALED-BEAM HEADLIGHTS HEADLIGHT SWITCHES



Guyan HEADLIGHT RESISTORS

For safety, long life and prevention of frequent burn-outs. Designed with ample capacity for your trolley voltage and the correct bulb voltage.

Guyan SEALED-BEAM HEADLIGHTS

PAR-46 sealed-beam lamps, encased in steel; with three lamp voltages:—heavyfilament 6-volt; long-lasting 32-volt; and current-saving 115-volt.

Guyan MERCURY TUBE HEADLIGHT SWITCHES

Non-arcing. Extra capacity. No weak parts to wear.

A HEADLIGHT PACKAGE—consisting of two Headlights (specify voltage desired), one headlight Resistor and one mercury tube Switch is available, as well as the individual items. Write for details.

Manufactured by GUYAN MACHINERY CO. LOGAN, W. VA.

Preparation Facilities

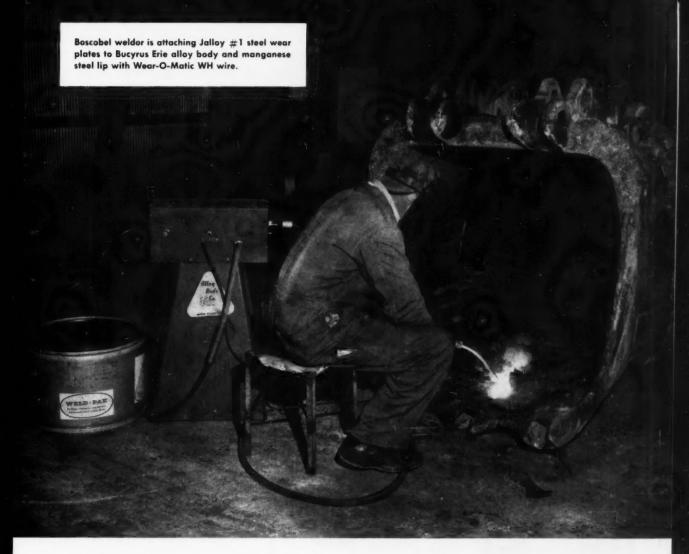
Carpentertown Coal & Coke Co., Mahoning, Pa.—Contract closed with The Deister Concentrator Co., Inc., for three Concenco No. 77 Diagonal Deck washing tables for cleaning 4x0 coal.

Island Creek Coal Co., Guyan No. 1 mine, W. Va.—Contract closed with The Eimco Corp. (prime contractor—Roberts & Schaeffer), for one Eimco 90-ft diameter thickener and one 8 ft 10 in 8-disc Agidisc filter.

Island Creek Coal Co., Algoma, W. Va.—Contract closed with The Eimco Corp. (prime contractor—Link Belt Co.), for one 8 ft 10 in 8-disc Agidisc refuse filter and one 8 ft 10 in 8-disc Agidisc clean-coal filter.

Lester Coal Co., Kelsa mine, Grundy, Va.,—Contract closed with The Irvin-McKelvy Co. for a 125-tph cleaning plant complete with multi-state stage ejectors and picking table, Scheduled completion, June 1, 1960.

Pocahontas Fuel Co., Itmann colliery—Contract closed with Western Machinery Co. for installation of five 56-in Wemco Fagergren flotation machines to treat plant fines. Completion scheduled, June, 1960.



35% Savings on bucket maintenance with NEW Wear-O-Matic WH welding wires

"Wear-O-Matic WH is the most versatile welding wire for bucket maintenance because it provides high strength welds in any of the popular alloy steels and has excellent resistance to impact when used for build-up work. Savings in time and labor through the semi-automatic open are application of this wire have resulted in less bucket down time and lower costs."

L. ARDEN HENLEY, SUPT.
BOSCOBEL GRANITE CORP., MANAKIN, VA.

WHAT about bucket maintenance in your shops? Costs too high due to too many manual welding applications? The important benefit gained by Boscobel Granite was the elimination of manual welding with stainless steel elec-

trodes to obtain the necessary high strength attachment welds for their rugged rock handling chores. These benefits can be yours whether you are welding manganese to manganese, manganese to carbon steel or either of these to any of the abrasion or impact resistance alloy steels. Then, without changing wires, your weldor can apply build-up deposits to lesser worn areas such as latch pins, keepers and lips . . . a deposit that will work harden to outwear manganese steel. To put more service life in the business end of your shovels and drag lines, investigate today the semi-automatic open are application of Wear-O-Matic WH wires. You'll lower your maintenance costs . . . decrease down time and increase working life. For complete details, request Bulletin AR-21. Alloy Rods Company, P. O. Box 1828, York 14, Pa.

ALLOY RODS COMPANY

YORK, PENNSYLVANIA

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COMPANY OF AMERICA

Dept. 12-5, P.O. Box 509, Elizabeth, N. J.

News Roundup (from p 28)

Electric House Heating Equipment Section, said at a symposium March 21 that the number of electrically-heated homes had grown to the present large number from only 100,000 in 1950.

The start of the next decade, he declared, will find electric heating built into all new homes. He noted that home owners have spent \$23 million so far in electric heating units for spare rooms, bathrooms and other similar locations, and forecast cumulative expenditures for such equipment of \$72 million by 1965 and \$191 million by 1970.

Stanley B. Aronson, symposium chairman, said: "The key to future growth of electric heating is the ability to purchase equipment without obstacles of any sort being placed in the purchaser's path. In the past, electric heating had to be bought. Today, however, we find our sales allies eagerly assisting us to introduce electric heating to home owners. Because of this favorable situation, we now find that electric heating is not only being bought, but that it is being sold."

Safety Award

Coal Age has been voted the National Safety Council's Public Interest Award for 1959.

The noncompetitive award annually honors exceptional service to safety by organizations in the mass-communication field.

Established in 1948, the award honors leadership, initiative and originality in the furtherance of accident prevention by the mass media.

Makes Offer

United States Steel Corp. offered to buy for \$10 million the coal deposits of Crow's Nest Pass Coal Co., Ltd., located mainly in the Kootenay area of British Columbia. Crow's Nest stockholders were scheduled to vote on the proposal at the end of April.

A U. S. Steel spokesman said the company was interested in the deposits, indicated at "several billion" tons on 250,000 acres, as part of its normal practice of insuring future raw-material supplies,

The offer sparked speculation among Canadian steel men as to whether U. S. Steel might build a British Columbia steel mill. But most felt the company wants the coal for its California-based operation. The purchase would be made through U. S. Steel's wholly-owned subsidiary, Columbia Iron Mining Co.

Favor Deal-In a letter to Crow's Nest shareholders, company directors recommended acceptance of the U.S. Steel

24" LOW



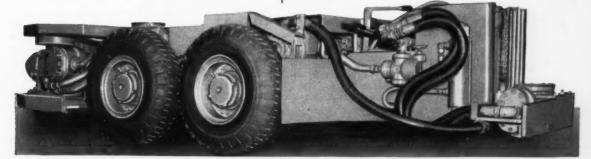
Delivers ALL the FEED YOU NEED in a Drill

designed especially for LOW COAL

A REMARKABLE DESIGN BREAK-THROUGH

in this entirely new Fletcher LOW Roof Control Drill provides the dependable, high-thrust, straight-from-the-floor feed of the telescoping mast with TWICE the flexibility - TWICE the height range of former machines. Add the following all-new advantages and you'll see why we think it's the finest low-coal drill on the market today.

- 5 full inches of underclearance.
- Just 7" of lost feed. (1/2 the previous minimum).
- Stall-proof, four-wheel full speed-range drive, with traction-type steer.
- Built-in internal dust collection with our new easyempty large capacity tank.
- Simplified low-maintenance hydraulic system. All controls at operator's position.
- Over twice the traction, twice the torque and more thrust than ever before.
- Can be equipped for rotary impact drilling where required.



Call us for more information on the new model DBE Fletcher LOW Roof Control Drill.

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O SCREEN SECTION SUPPORTS ON VIBRATING EQUIPMENT

What is the condition of the screen section supports? Are they worn—are they the right type, number and camber? Are there the right number of supports? Are the covers designed properly for the type of screen being used? Any of these factors can cause whipping of the cloth and excessive screen section wear. Call Cleveland Wire for valuable assistance and top quality vibrating screen section cloth.

Write for FREE maintenance-reducing check sheet today.

THE CLEVELAND WIRE CLOTH & MFG. CO.

EAST 78th STREET

CLEVELAND 5, OHIO

THIS MINE MANAGER KNOWS



The Kennametal bit is one of the best time savers put on the market for the production of coal. It stays sharper longer, cuts labor time, and speeds up production.

KENNAMETAL Inc.

MINING TOOL DIVISION
Bedford, Pennsylvania

News Roundup (Continued)

proposal, listing several main points stipulated in the offer: In 4 yr from May 1, Columbia Iron would spend not less than \$500,000 in exploration and metallurgical tests of Crow's Nest coal; Columbia would have an alternative right if substantial quantity of metallurgical coal is not found on the purchased land, to buy all coal operations for \$17 million: Crow's Nest timber, petroleum and natural-gas rights would not be affected.

Builds New Plant

Pittsburgh Chemical Co., subsidiary of Pittsburgh Coke & Chemical Co., will build a \$4 million plant in Boyd County, Ky., for the firm's granular coal-derived activated-carbon business.

The plant, to be called "Big Sandy," will be on a 25-acre site along the Big Sandy River south of Catlettsburgh, Ky. The facility should be completed early in 1961.

Activated-carbon sponge-like granules are used in a wide range of purifying and decolorizing applications. Pittsburgh Coke entered the field in 1940 at the request of the United State Government

to develop greater capacity and quality for activated-carbon used in gas masks. The firm has continued to expand and holds another 225 acres in the same area for further growth.

Publish Directory

The 1960 edition of Coal Mine Directory, a McGraw-Hill publication, is now available.

This directory lists 1,214 coal operating companies and 1,544 coal mines and companies in the United States and Canada, These each produce 50,000 tons or over, the total accounting for more than 90% of the production of the two nations.

Listings are alphabetical, by state and district. Easy and quick reference is afforded by both alphabetical and geographical indices. Data for companies include names and addresses of company and executives.

For mines, data include locations by town, county and railroad or river serving, mine officials, type of operating seam and seam thickness, preparation or cleaning-plant equipment, mining and haulage equipment, average employees, daily capacity and actual 1959 or 1958 production.

Slag Research

A market may be developed for mountains of fly ash and wet-bottom boiler slag whose removal now is an expense to power plants-especially those of major utilities.

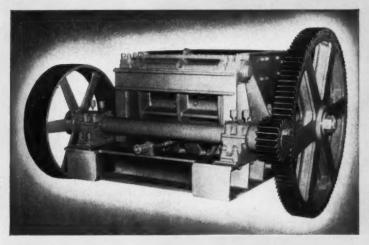
University of Illinois engineers are embarking on a 5-yr project to set standards for using this material in secondary-road construction. Professor George W. Hollon is in charge.

Four industrial sources have pledged \$13,200 a year for 5 yr to support the work. They are National Lime Association; Pozzolan Products Co., and Marblehead Lime Co., Chicago; and Poz-O-Pac Co. of America, Philadelphia.

The first 3 yr will be devoted to an aggregate, lime, fly-ash mixture on which Professor Hollon has been doing research for 4 yr. This is now being field tested on several secondary roads in northern Illinois by Cook and Lake County Highway Depts. A similar mixture has been used in the East for 10 yr. The final 2 yr of research are scheduled for tests on use of lime to stabilize roadways.

Power plants in Illinois alone produce 1.5 million tons of fly ash and wet-bottom boiler slag a year, enough to make 210 mi of roads. For the research, a highway test track 26 ft in diameter is being built at the university. Here road materials will in a week get the equivalent of a year's wear in secondary roads.

(Continued on p 54)



PENNSYLVANIA HERCULES

New job-proved single roll crusher brings you lower operating, maintenance costs

Pennsylvania has researched the factors that make single roll



Cast alloy steel roll shell is made in one piece and keyed as well as shrunk on the rollshaft. No segments or renewable teeth to loosen or fall out. Readily accessible teeth are easily built up by welding. crushing costs mount—and come up with a new machine specifically designed, and *job-proved*, to keep costs down.

Here are just a few high spots of this great new crusher:

 Hopper jams are prevented by the larger hopper opening and spacious throat opening made possible by the contour of the breaker plate.

New automatic toggle release

supplies positive release mechanism for breaker plate.

New design of countershaft placement, plus large diameter of the gear improve stress distribution on countershaft bearings.

Hercules bearings are away from the frame. Easy to get at, easy to maintain.

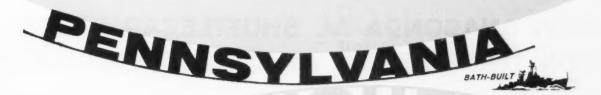
Breaker plate is heavy steel fabrication lined with cast manganese steel wearing plates; guaranteed against cracks and flaws.

If you have a job where a single roll might be used, find out more how this new Pennsylvania Hercules will save you money in more ways than one. Send for new Bulletin 2020.



PENNSYLVANIA CRUSHER DIVISION BATH IRON WORKS CORPORATION WEST CHESTER, PENNA.

Over 50 years concentrated experience in all types of material reduction makes Pennsylvania your best source of crushers and engineering advice and service. Call on Pennsylvania with your next crushing problem. Representatives from coast-to-coast.





What better testimony to the long-range economy of the new Anaconda Shuttlecar

NEW ANACONDA AC SHUTTLECAR CABLE— FOR TWO YEARS AND STILL IN EXCELLENT

Two years of constant pulling, scraping, crushing, pinching and mine water hazards—and this Anaconda AC Cable is still in excellent condition.

This long, minimum-maintenance life lets you take full advantage of modern, efficient *AC* equipment. Such long, dependable life is also a tribute to the advanced design of this new, three-phase *AC* cable. For it is built *flat* with parallel conductors and grounding wires to minimize mechanical damage. The conductors are protected by special-patented

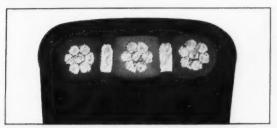
nylon breaker strips which greatly reduce the possibility of phase-to-phase shorts. The flat configuration also means increased protection from runover damage and — easy, fast reeling.

Equally important, Anaconda is first to give you this improved, advanced design built throughout with rugged, mine-proven Anaconda Neoprene. Anaconda's all-Neoprene (both insulation and jacket) construction withstands the torture conditions of mining and keeps on operating.



Cable-a two-year record of operation in the rough, tough service of the Independent Coal and Coke Mines of Carbon County, Utah.

IN ROUGH SERVICE CONDITION



Cross-section of Anaconda AC Shuttlecar Cable

Consider the advantages offered you by AC

Small, highly automatic, efficient and profitable AC mining equipment is now available. And minimum maintenance and long life of Anaconda's AC Shuttlecar Cable makes it even more economical for you to modernize with AC.

Contact your nearest Anaconda District Office or write for full details: The Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

ASK THE MAN FROM

ANACONDA®

ABOUT THE NEW AC SHUTTLECAR CABLE

Will Review Case

The Supreme Court has agreed to review a natural-gas case which is of major importance to the entire fuel industry. The facts are as follows:

The Consolidated Edison Co. of N. Y. proposed to buy large quantities of natural gas directly from Texas producers, to be transported by Transcontinental Gas Pipe Line Corp., and used to fire boilers at Edison's plant on the East River in New York City.

The Federal Power Commission refused the approval sought by Transco on the grounds that the proposed price was too high, that the proposed end use was "inferior," and that the use of pipelines for such transportation purposes might reduce the amounts of gas otherwise available for more important needs.

The commission's ruling was reversed by the United States Court of Appeals for the Third Circuit in Philadelphia, which held that the FPC had no power to consider the end use of the gas or the effect of the sale on price levels, and directed the commission to issue the certificate. It is this decision the Supreme Court has decided to review. The argument is scheduled for the term beginning in October, with no decision expected before winter.

Petitions for review were filed by United States Solicitor General J. Lee Rankin, and by Fuels Research Council, Inc. Opposing briefs were filed by Con Ed, Transco and New York City Corp. The outcome of the action is expected to set a trend towards defining the extent of FPC jurisdiction over end uses of interstate natural gas.

Better System

Crawford L. Wilson, state mine director for West Virginia, says he believes a way could be worked out to give a better chance of survival to men trapped behind a mine fire.

Citing the recent tragedy at Island Creek Coal Co.'s Holden 22 mine, in which 18 men died, Mr. Crawford said that escapeways provided for under present law are nearly useless.

"All escapeways could be made useless in 2 hr by a fire in the main passage of a big mine, such as the one which broke out at Holden March 8," he said. Mr. Wilson directed the unsuccessful rescue effort at the mine.

He noted he was working on a plan to provide barricaded areas near all working places, with their own ventilation systems independent of the mine ventilating system. Trapped men could retreat to these areas and be assured of fresh air while awaiting rescue, added Mr. Wilson.

He continued that it would be im-



■ Tough jobs call for tough screens... screens that have been carefully, intelligently engineered. By making tough jobs look easy, Bee-Zee Screens make you money. They're all-stainless-steel and all-welded, with rods spaced precisely by electronic control. The equipment you own and operate right now can be equipped with Bee-Zee Screens—as shown above or in any of the rod shapes shown below. Wire, write or phone Galesburg DIckens 2-5154 collect.

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You too can MOVE COAL MORE PROFITAB WITH LONG **LO-ROPE CONVEYORS**

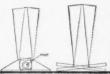
If you asked only a few of hundreds of mine superintendents why they specified Long Lo-Rope Conveyors you'd probably get a number of different answers. Some of them would say they solved safety problems, others that they eliminated spillage and time consuming realignment of conveyors by replacing out-dated systems. Chances are, you too will move coal more profitably with Long Lo-Rope Conveyors.

If you're considering new conveyor equipment, check the four special advantages of the Long Lo-Rope Conveyor illustrated (right). There are many more advantages, but these four will give you an idea how so many mine operators are saving time, money and material with Long Lo-Rope Belt Conveyors.



BELTS STAY CENTERED

Self-aligning idlers are top mounted on ropes allowing belt motion to tip idlers in direction of travel. Inward lines of thrust tend to help keep belt and loads centered.



CONVEYOR STAYS ALIGNED

"Rocker" support stands move back and forth to compensate for uneven loads . . . can't "walk" out of position like one piece stands.



GREATER CAPACITY . . . LESS SPILLAGE

Long Lo-Rope 27° fixed on troughing angle centers loads better and increases belt capacity. Also, the greater "cup" of belting eliminates the chance of belt spilling by flattening between idlers.



SAFER . . . SAVES BELTS

Ropes are completely out of the way making it far safer to handle man and supplies. And, even with severe mis-alignment, the belt can't be cut to ribbons by hanger stands. For complete details, write: The Long Company, Oak Hill, West Virginia.





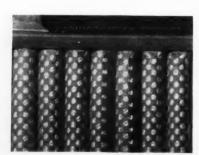


THIS BATTERY LETS YOU HAUL MORE TONS PER DOLLAR... AND DO IT LONGER



New improved Exide-Ironclad Batteries give you up to 45% more power than the same size battery you may be using now—and longer life as well. Positive plate active material is made more useful by higher porosity tubing—with a corresponding increase in battery capacity and cost economy. As a result, your equipment can pull more tons of load per dollar of battery investment. Exide-Ironclad tubular construction protects the active material from battery-killing vibration and jarring—you get years' longer service life without failure.

The largest work output for the longest time—not purchase price—is the key to true battery economy. So when you need batteries, specify Exide-Ironclad and get the most production capacity your dollars can buy. For details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.



Here's Why—The improved Exide-Ironclad tubular positive plate packs more active material for greater capacity. The armored porous tubing holds the material securely for long battery life, yet permits free access of electrolyte for high power under sustained load.



News Roundup (Continued)

perative under such a plan for all miners to be familiar with the locations of safe areas they could go to in case fire underground cut off usual mine travel routes.

Scholarships

Sixteen of Southern Illinois University's 101 forestry students currently hold scholarship awards covering tuition and fees, from Sahara Coal Co., Chicago 5.

The awards are part of 60 1-yr scholar-ships provided at SIU over a 4-yr period by the firm to encourage forestry study. This is the third year that the Sahara scholarship program has been in effect at SIU. They are available to freshmen and sophomore forestry students with high scholastic standards and other qualifications, such as leadership, character, and interest in forestry. Grants are distributed to the students on a quarterly basis and remain in effect only while the student continues to meet the qualification standards.

Southern's 4-gr degree program in forestry was activated Jan. 1, 1958. Enrollment has doubled each year since.

Awards Contracts

Kentucky Power Co., subsidiary of American Electric Power Co., awarded contracts to Westinghouse Electric Corp. and Babcock & Wilcox Co. for major equipment to be installed at KP's Big Sandy plant, soon to be built in eastern Kentucky.

The \$39 million plant will be located on the river of the same name near Louisa, Ky., and will be integrated with the other 15 major power stations of the seven-state AEP system,

The plant's 265,000-kw steam-turbinegenerator unit will be built by Westinghouse; the turbine at its Steam Div., Lester, Pa., and the generator at its East Pittsburgh, Pa., plant, The turbine will run at steam pressure of 2,400 psi and temperature of 1,050 F.

Babcock & Wilcox will build the 150-ft-high steam boiler, of the pulverized fuel-fired, reheat type. It will be able to supply 1,890,000 lb of main steam per hour and 1,534,000 lb of reheat steam per hour.

Protest Dumping

United States coal exporters have told Congress that West German cartels are dumping coal in other countries below the price of U. S. coal and making up their losses from high prices charged in Germany behind a protective tariff.

Safety Gets the Spotlight



EMPLOYEES of United States Steel Corp.'s Robena No. 3 mine listen attentively at a 2-hr accident-prevention session, part of a 6-hr course conducted by J. B. Yanity, U.S. Bureau of Mines, Dist. B., Pittsburgh, designed to keep mining personnel abreast of the latest safety developments, and dealing mostly with roof-fall accidents. Other companies which had men attending Bureau safety sessions included Pittsburgh Coal Co., Harmar Coal Co., Butler Consolidated Coal Co., Delmont Fuel Co., and Allegheny-Pittsburgh Coal Co. These men had completed 3 yr ago a 16-hour accident-prevention course.

THIS MINE GENERAL MANAGER KNOWS



Kennametal and I have been friends for fourteen years. We tried other bits at times, but Kennametal is my choice. Ninety per cent of the coal we have mined in the last fourteen years has been drilled with the Kennametal bit.

KENNAMETAL Inc.

MINING TOOL DIVISION Bedford, Pennsylvania Relations Committee of the Coal Exporters Association of the United States, Inc., said West Germany maintains a tariff of \$4.67 a ton on most U. S. coal on grounds that it must protect its own industry, yet offers coal to Rotterdam at prices \$3.26 a ton below American coal,

Mr. Buckley, in testimony prepared for the Senate Interstate and Foreign Commerce Committee hearings on foreign trade, said U. S. coal exporters feel that West Germany is not "quite fair to the American bituminous coal industry in continuing . . . the iniquitous and inequitable discriminatory tariff."

West Germany, despite U. S. protest, imposed the \$4.76 per ton tariff in 1959 on shipments over 4.4 million tons a year, drastically reducing U. S. coal shipments to Germany.

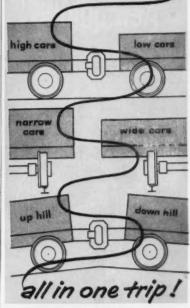
Mines, Companies

The United States Court of Appeals for the Sixth Circuit has sustained the West Kentucky Coal Co. and the Nashville Coal Co. in their contention that a contract which Tampa Electric Co. sought to enforce, calling for the supply of large quantities of coal over a 20-yr period, was invalid, and violated the Clayton Act and the anti-trust laws.

(Continued on p. 58)

NOLAN AUTOMATIC LOADING STATION

assures positive continuous loading of





NOLAN Automatic Loading Station (at top)
with NOLAN Hold-a-trip in distance

No stopping—no stalling No tipping—no derailing



Let us tell you and show you why the Nolan Automatic Loading Station is better engineered and includes safety features for every operating condition

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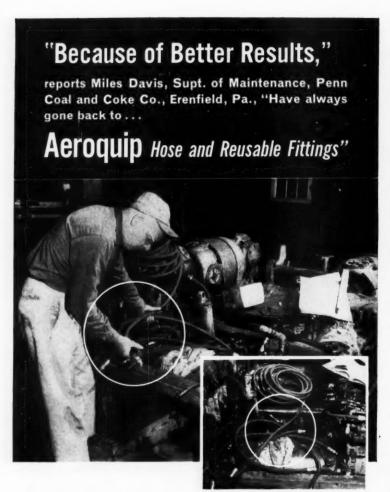
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2, Calorado Frenk C. Memmatt, P.O. Box 154, Castle Gate, Utah J. L. Yhomas, 439 Sauth 24th Street, Birmingham S Alebamu

(Chicago District)
Levitt Safety Limited, Toronto 10, Canada

THE NOLAN COMPANY



They need the best in the repair shop at Penn Coal to keep machines on the job for their three-shift day. After testing against other products, they have found Aeroquip Hose and Reusable Fittings give better results. So easy to use, too. A small inventory covers all needs and assembly requires no special tools or training.

Our files are full of enthusiastic reports from users that prove you're in good hands when you consult with Aeroquip. Your Aeroquip Distributor, a fluid line specialist, will give you our 204 Catalog. He'll discuss various applications that might be helpful to you. His number is in the "Yellow Pages" under "Hose."



Aeroquip is so easy to use—inventory's just a few feet of hose and a handful of fittings.



AEROQUIP CORPORATION, JACKSON, MICHIGAN

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AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A. AND ABROAD



MILESTONE is commemorated at Van mine, W. Va., Youghiogheny & Ohio Coal Co., where the 50 millionth "West Virginia"-brand roof bolt, made by Connors Steel Div., H. K. Porter Co., was installed. Charles A. Baisch Jr. (left), product manager, mine roof bolts, Connors Div., presents plaque recording occasion, to Glen Kitchen, Van superintendent.

Mines, Companies (Continued)

Peabody Coal Co. has published an informative booklet called "Coal . . . Ancient Storehouse of Modern Living."

The booklet tells a story of the importance of coal to the national economy, Peabody officials believe the booklet is particularly timely because of the resurgence of coal during the past several years. Peabody plans to distribute the booklet fully within the industry, as well as to educational outlets.

Sovereign Pocahontas Co., Cleveland, 13, has been appointed sole sales agent for Lillybrook Coal Co., Grundy, Va.

Pocahontas Land Corp. recently acquired Lillybrook from the Pittston Co., the transaction involving several thousand acres along with the recently-closed Killarney, Lillybrook and Affinity mines in Raleigh County, W. Va. Lillybrook plans to reactivate its No. 3 mine, getting into production shortly.

A new mine and 4,000-tpd coal-cleaning plant are being considered by Stonega Coke & Coal Co., Big Stone Gap, Va. Cost would be about \$2.5 million, it is estimated.

The mine and plant would handle Taggart seam coal, which, when cleaned, has 2.5% ash and less than .5% sulphur, according to Stonega. The site for the plant would be above the old Stonega mine, where there is enough space, water supply and accessibility to the seam for a draft mine.

Island Creek Coal Co. began at the end of March to clean up its Mine No. 22, where 18 men recently lost their lives in a fire.

(Continued on p 64)

Rock-Ribbed
Payhauler®
GIVES YOU
new loadspeeding



Of all rear-dumps in their size classes, only the International 65 and 95 Payhauler models give you the weight-shedding, strength-multiplying, rockribbed corrugated bodies! You trade 2½ tons of power-wasting dead weight for 3 bonus tons of capacity in the new 95 Payhauler!

Only the 65 and 95 Payhauler models have the power "plus" of the direct-start, high-torque, 4-cycle 6-cylinder International "817" Diesel engine! The "95" is powered by the 375-hp DT-817 turbocharged Diesel; the "65" has the same basic, high-output power plant: the naturally-aspirated 250-hp D-817!

Choose the "95" with power-shift torque-converter, or 9-speed air-shift transmission. The "65" comes with 10-speed constant-mesh transmission. Both models have the load-speeding safety of reserve-area braking and "one-hand," road-holding power steering! Above, it's the "65" shown storming up a 16% grade with 19-ton payload. Compare how Payhauler gradeability speeds the cycle over other haulers!



capacity!

In minimum shovel time you heap-load the big-target Pay-hauler body. Rugged corrugations absorb rock-shock—give high resistance to wear and distortion from abrasion and impact! Torque - cushioning planetary-type axles let you apply full power to start and haul full loads!

Add up the capacity-boosting advantages of Payhauler power-to-payload punch—super-speedy Payhauler loading, hauling and dumping. See how either the 19-ton "65" or 27-ton "95" can give you gear-faster climb-outs—and haul up to 14% faster than other rear-dumps! See your International Construction Equipment Distributor for a demonstration!



Here's your 76-page cost and production estimating book—
newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



Get 11-second Payhauler dumping with exclusive, action-speeding inverted hoist design! Simple, easy-to-operate up-and-down snubbing control prevents machine-punishing impact! Fast reverse, up to 7.1 mph., speeds spotting to dump or load!



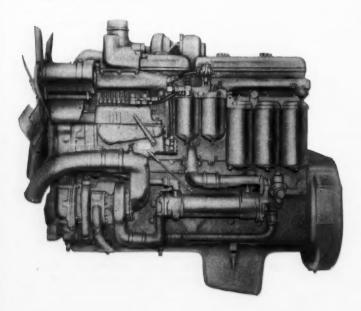
International[®]
Construction
Equipment

International Harvester Ce., 180 North Michigan Ave., Chicago 1, Illinois A COMPLETE POWER PACKAGE

How BRAWN-BACKED Payscraper features give you stepped up...loading

From power plant to push-block, the 34-cu. yd. International 295 Payscraper gives you an exclusive combination of features that step up dirt-on-fill delivery! Compare quiet, big-capacity DT-817 Payscraper power. Try the advantage of up or down, on-the-go, Payscraper power-shifting that provides load-speeding automatic direct-drive lockups in second, third, and fourth gears! Measure extra value features like safe, effortless power-steering-that leaves "the steering feel in the steering wheel." Note how exclusive torque-cushioning planetary drive axles add dependability to rough-and-tumble earthmoving! See how 122-inch bowl width speeds loading and unloading-adds control ease and stability, loaded or empty. Prove on your job that bonus performance "rides" the Payscraper bowl. Choose the 2-axle "295"; or 3-axle, 34-cu. yd. "495." See your International Construction Equipment Distributor for a demonstration.

Payscraper power-to-payload punch tops all other rubber-tired rigs—because the fast-slugging, high-torque International DT-817 diesel is the Payscraper power plant! The 375-hp, turbocharged DT-817 gives you direct, push-button starting; all-altitude high-efficiency performance; power for top rim-pull to help speed all steps of the cycle; time-saving "no-lag" control power!



... roading

... dirt-on-fill capacity!



Even "dead" sand comes alive and "boils" fast into the Payscraper bowl. Every detail of Payscraper design aims at speeding the cycle, and staying available! The 21-inch diameter steel cross tube provides super load-bearing strength and resistance to impact. Bowl "backbone," draft arms and side reinforcing members all are massive high-strength box-section steel weldments. "X"-member reinforcing maintains perfect push-frame alignment at all times. And the 4-speed, planetary-type, torque-converter power-shift transmission automatically adjusts torque and load to speed — to maintain full capacity!



You steer the 140,000-lb. loaded Payscraper almost as easily as a 3,600-lb. automobile! Payscraper gives the big control advantages of (1) exclusive International rack-and-pinion plus tandem pump steering system; and (2) 3-degree forward spindle pitch that improves scraper balance and prevents "nose downs" in high-speed turns. The 16-adjustment, bump-smothering seat builds operator confidence, too. And reacheasy power brakes, "control tower" vision, and flush deck safety help him deliver full Payscraper capacity, and take advantage of speeds up to 33.5 mph. He commands ample power and traction to pull directly out of 90-degree turns, even on soft fills!

The fast, positive-acting Payscraper ejector mechanism is powered by the International PTO-driven Cable Control Unit. One cable drum of this simple planetary system actuates the apron and ejector; the other drum positions the bowl to control spreading action. Apron lifts to a big 94-inch opening. Two ejector-plate pushing members apply dozer-like action to force out the whole 34-cu. yd. load cleanly. Action of six heavy-duty springs, stretched during ejection, positively powers the ejection mechanism's return!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

International Harvester Co., 180 N. Michigan Ave. Chicago 1, Illinois A Complete Power Package



International Construction Equipment

Power-steer and power-shift

with TD-25 standard equipment ... for full-load turns ...full-speed cycles!



Keep big rock loads on the move full time, with exclusive Planet Powersteering. Full power on both tracks, full time is the answer! And Hi-Lo, onthe-go power-shifting lets you match power to condition, instantly, and keep the yard-boosting advantage of uninterrupted momentum!

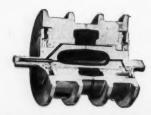
Big power "plus" of the new TD-25 is the new direct-start, turbocharged 6-cylinder International DT-817 diesel engine. This versatile engine also powers International Payscraper®, Paywagon®, and rear-dump Payhauler® models - plus the TD-25. Equipmentspread power standardization simpli-

fies your servicing and parts-stocking.



Cleaning the face of a Missouri strip mine behind a big dragline, this TD-25 shoves "tractor-sized" boulders aside with the greatest of ease. The "25" also builds dragline walkways and haul roads; pushes loaded trucks; and drastically cuts the cost of clearing new stripping areas.

Thickest-shelled roller design in the crawler industry—with king-size lube reservoirs and seal-protecting pressure-relief passages-let you power-lubricate without affecting seal life or efficiency. These are Dura-Rollersthe track rollers that make 1,000-hr lube intervals practical!





No attachment! No after-thought! No stop-gap!

Years'-proven Planet Power-steering and Hi-Lo power-shifting are designed-in, built-in, basic standard equipment of the new 230-hp International TD-25.

With "live-track" Planet Power steering, you get full-load king-size crawler efficiency on turns, as well as straight-aways. And Hi-Lo power-shifting gives you on-the-go matching of power to load to give you big, cycle-speeding advantages!

International Planet Power-steering eliminates load-limiting "dead-track" drag. And Hi-Lo power-shifting does away with time-wasting "gear-shift lag." No wonder the new TD-25 can outearn king-sized clutch-steered crawlers up to 50%—on tough high-walling; overburden removal; and many other coal, mineral, or building-material mining jobs!

Big-capacity track-and-engine teamwork

New TD-25 7-roller tracks are strength-matched to team with the full effort of the New 230 hp diesel engine. The "25" is platformed on super-rugged double-box-beam frames—and carried smoothly on International's new minimum-maintenance Dura-Rollers!

Press the direct-start button, to command the "25's"

free-breathing diesel horsepower. Dual valving of the "25's" high-torque DT-817 engine provides for peak turbocharging efficiency—to deliver full-rated performance from sea level to timberline!

Full TD-25 performance is at your fingertips, full time!

Power-shift and power-steer the new "25" with kingsized loads—around curves, upgrade, anywhere. Compare years-proven simplified International planetary design that's engineered and located to break the loadlimiting, time-losing steering and shifting bottlenecks which plague king-sized clutch-steered crawlers. Measure all the "25's" standard equipment extra value features. Let your International Construction Equipment Distributor demonstrate!

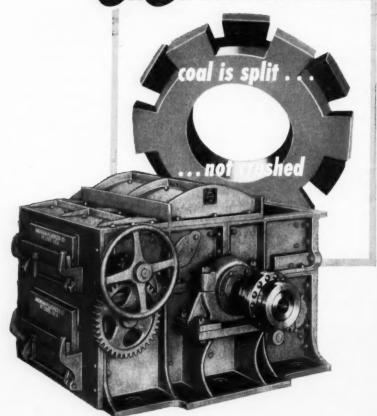


International Harvester Co., 180 N. Michigan Ave. A COMPLETE POWER PACKAGE: Crowler and Whoel Tractors... Self-Propolled Scrapes can Botton-Duny Wogons... Crawler and Rubbs-Tirock Loaders... Off-Highway Houlers... Diesel and Carbursted Engines... Motor Carburster Company Compan



PERFORMANCE-PROVED





American Rolling Ring Coal Crusher

In 1908 American Pulverizer patented the rolling ring principle of coal reduction. Today there are thousands of American Coal Crushers in operation ranging in size from Sample Crushers to Crushers having a capacity of 800 tons per hour.

American manufactures reduction equipment exclusively, backed by a half century of experience in the production of coal reduction equipment. Although improvements have been consistently made in American Crushers, the rolling ring principle still remains the most efficient method of coal reduction. This fact is performance-proved by hundreds of "cost of operations" reports from customers of American Rolling Ring Coal Crushers. May we have our engineers analyze your reduction problem?

Complete Literature Available. State your tonnage requirements.

"When you figure costs — the best results come from American Rolling Ring Coal Crushers."



PULVERIZER COMPANY

OF RING CRUSHERS AND PULVERIZERS

SAINT LOUIS 10, MO.

Mines, Companies (Continued)

N. T. Camicia, vice president and general manager, said the area containing the fire had been sealed at both ends to prevent it from receiving oxygen. He said one of the seals would be broken and that carloads of smoldering coal, roof-fall, and other material in the area, would be removed. "After we've got it cleaned up, it will be inspected by state and federal officials and by our own people," he continued. "We have every intention of putting the mine back into production."

Utilization

The reign of the steam locomotive in Canada is at an end. In 1960, the Canadian National Ry. will become the first major Canadian rail system to become 100% dieselized.

In 1950, delayed by depression and

Meetings

Charbonnages de France, International Conference on Strata Control, May 16-20, 1960. Presentation of results obtained from laboratory experiments and underground measurements and observations—Paris, France.

Fourth International Congress on Coal Preparation, May 28-June I— Harrogate, Eng.

Appalachian Underground Corrosion Short Course, June 1-3, Fiftyseven classes, 15 new papers and 25 new speakers—West Virginia University, Morgantown, W. Va.

Tenth Annual Short Course on Coal Preparation, June 6-July 15—School of Mines, Extension Dept., West Virginia University, Morgantown, W. Va.

Short Course in Coal Mining, June 6-July 29—West Virginia University, Morgantown, W. Va.

Central Appalachian Sect., AIME, spring meeting, June 10-11—Abingdon, Va.

Mine Inspectors' Institute of America, June 12-15—Louisville, Ky.

Gordon Research Conferences, Chemistry of Coal, June 13-17—New Hampton School, New Hampton, N. H.

Institution of Mining Engineers, summer meeting, June 27-July I—Cardiff, South Wales.

National Safety Congress, 48th annual meeting, Oct. 17-21 — Conrad Hilton Hotel, Chicago.

...record low-cost performance on the job! set by TOR

JOANNE COAL COMPANY UNION TRUST BUILDING

PITTSBURGH 19, PA.

March 15th, 1960

Mr. Gordon MacVean, National Mine Service Company, 2530 Koppers Building, Pittsburgh 19, Pennsylvania.

Dear Mr. MacVean:

It is a pleasure to state our experience with the two National Mine Torkars which have been in our service since April

We have kept detailed records of the performance of various makes of shuttle cars in our mines, as to be expected, and the Torkars show up extremely well.

You will be gratified to know that the two Torkars have hauled 343,882 tons of clean coal at a maintenance parts cost of only 0.5¢ per ton, with less than 90 hours of downtime for repairs. Cable costs were 65 percent of total maintenance parts cost of

I will add only that when additional shuttle cars were ordered this year, Torkars were chosen.

Parts cost of only 1/2 cent per ton!

> The Trend is to TorKar

CBB: bh

Very truly yours,

JOANNE COAL COMPANY

Thurle B Baton

Charles B. Baton, Vice President

DISTRIBUTING DIVISIONS:

ALABAMA DIVISION ALL-STATE DIVISION ANTHRACITE DIVISION Forty Fort, Pa.

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Jenkins, Ky. CLARKSON DIVISION ASHLAND DIVISION Nashville, III.

GREENSBURG DIVISION Greensburg, Pa.

Koppers Building

National Mine Service Company



Pittsburgh 19, Pa.

MANUFACTURING DIVISIONS:

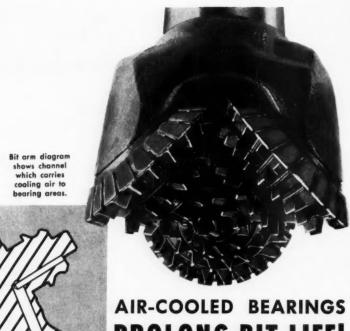
Birmingham, Ala.

Logan, W. Va.

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IN CANADA:

NATIONAL MINE SERVICE (CANADA) LIMITED, Elliot Lake, Ontario



PROLONG BIT LIFE!

SECURITY'S special air-bleed holes that cool bit bearings are one of many features that con-tribute to the outstanding drilling performance of Security bits. Others include precision-matching of roller and ball bearings, scientific heat-treating, and the application of tungsten carbide hardsurfacing to bit teeth by special atomic-hydrogen welding.

Security makes the right bit for every blasthole drilling job - assuring faster penetration, rugged durability, and real economy. WRITE for catalog.

Security air bits arrive at a strip-mining location.



REAMERS . HOLE OPENERS STABILIZERS . CASING SCRAPERS INC.

OIL . GAS CHEMICAL MINING

PLANTS... Dallas, Texas; Whittier, California; Manchester, England SECURITY ENGINEERING DIVISION . . . 3400 W. Illinois, Dallas, Texas EXPORT OFFICE . . . Post Office Box 13647, Dallas, Texas CANADA . . . Security Engineering Canada, Ltd., Edmonton, Alberta, Canada OVERSEAS . . . Security International C. A., Caracas, Venezuela; London, England

Utilization (Continued)

then war, the 10-yr dieselization program was started. At that time the railway had 2,463 steam locomotives. By June of this year, these will be completely replaced by 2,144 diesels and 28 railliners. Cost has been more than \$1 billion.

Sales of automatic anthracite equipment for home heating continued to climb in 1959, the Anthracite Information Bureau reports.

Last year marked the sixth consecutive year in which equipment sales surpassed the previous year. Integral-boiler and furnace-burner-unit sales were 13.8% ahead of 1958. Of the integral-unit sales, 89% were boiler-burner units. Combined sales of conversion stokers and integral units were 9.1% ahead of 1958.

H. Zinder & Associates, consultants to Kittitas County, Wash., is negotiating with the Northern Pacific Ry. Co. for a 2-yr extension of leases on coal mines in the county to furnish coal for a proposed steam-generating plant.

Present leases expire July 1. An extension would allow more time for negotiation of agreements with prospective buyers of power to be generated by the

There was little solace for Nova Scotia coal producers in a brief presented by Ontario officials in Toronto to the Rand Royal Commission on Coal.

Ontario offered to do its best to find ways of encouraging use of Maritime coal in Ontario, but the province frankly admitted it expected its future needs would continue to be served by United States producers.

Bituminous Output

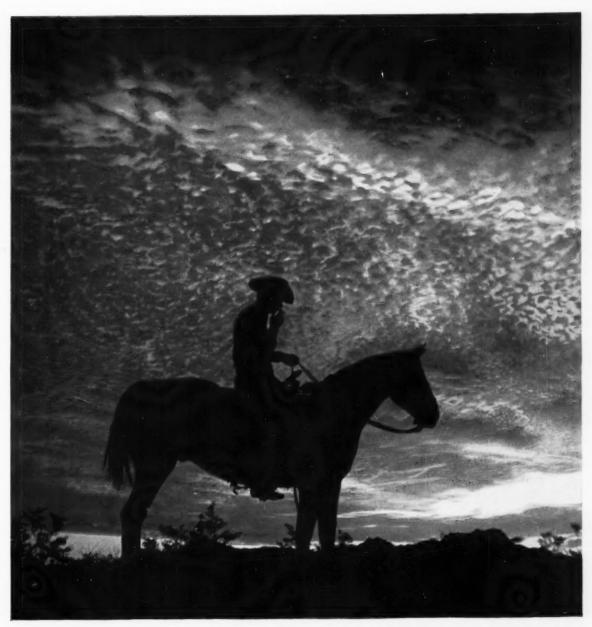
YEAR TO DATE **PRODUCTION** April 16, 1960 126,475,000 April 18, 1959 125,830,000 1960 output 0.5% ahead of 1959. A month earlier output was 2.0% behind 1959.

WEEK ENDING PRODUCTION April 16, 1960 April 18, 1959 8,152,000

Anthracite Output

YEAR TO DATE April 16, 1960 5,543,000 April 18, 1959 6,140,000 1960 output 9.7% behind 1959. A month earlier output was 12.9% behind 1959.

WEEK ENDING PRODUCTION April 16, 1960 354.000 April 18, 1959 363.000



in the Saddle POTAL 1105-BLUE

Few men enjoyed the distinction of being "tall in the saddle." To be fast on the draw, to ride and work better than most men, to radiate confidence in everything—these are some of the things a man had to be before he won the compliment. It had to be *earned*.

Much of this applies to wire rope. Like Roebling Royal Blue Wire Rope for a "tall-in-the-saddle" example. Wherever it goes to work it makes a lasting impression. It works harder and better than other wire ropes—it radiates confidence on the job.

Royal Blue's resistance to the ills that wire rope is heir to: impact, crushing, shock, abrasion—is truly outstanding. It is the toughest wire rope you can use for a long time to come.

We have a wealth of Royal Blue data in the forms of literature, workaday applications throughout industry and hard facts on how this "happy breed" can keep a lot of your wire rope money where it belongs—in your pocket. If you will write Wire Rope, John A. Roebling's Sons, Trenton 2, New Jersey, we'll tell you all.

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WEMCO HEAVY MEDIA SEPARATION PLANTS AND EQUIPMENT:

Operators' Choice-World Wide!

The choice of the heavy media separation process for profitable, premium production is a sound one.

And the choice of Wemco for HMS plants or equipment insures superior results and lowest-cost per ton treated.

Know-how is the answer to the Wemco record in HMS. Since the development of the very first HMS plants, Wemco technical knowledge and equipment—or complete plants—have accounted for more than half the installations around the world.

Small wonder that Wemco is considered the standard of Heavy Media Separation everywhere.

THE WEMCO MOBIL-MILL:

Pre-engineered, prefabricated; ready for profitable production from the first day of operation. Nearly 200 of these complete plants are in operation. The Wemco Mobil-Mill is the answer—for positive results, known-in-advance costs.



a division of

Western Machinery Company 650 Fifth St., San Francisco 7, Calif. and throughout the world



Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry



MAY, 1960

IVAN A. GIVEN, EDITOR

Mine 22 Meaning

AS SOON AS you go underground you encounter inherent hazards. Among them are roof and side troubles from simple falls up to complete collapse. And when you go underground for coal you are faced with additional hazards—explosive dust, for example, in bituminous mining, and gas and fire in both bituminous and anthracite. So far, no 100%-effective answer to these hazards has been found. This is evidenced by the fire at Island Creek 22, with its toll of 18 lives. They would not have been in hazard had the fire not occurred and they might have been saved except for the human element involved in the large percentage of injuries and fatalities.

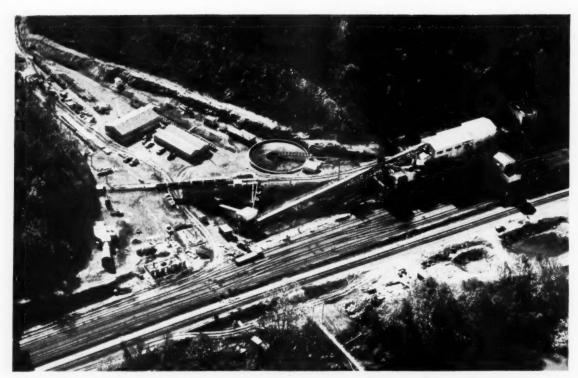
This is not to state or imply that blame, if any, is to be laid completely or primarily on any one involved—management, men, and state and federal inspection and safety services—more than any other. Even in advance of the formal findings it became evident that the fatalities which resulted were an outgrowth of perhaps three things in particular: (1) the presence of open wires—for all practical purposes a necessity under prevailing custom, regulations and attitudes—which created the situation where ignition was possible, (2) a combination of circumstances which denied the men behind the fire a ready escape route, and (3) failure of the trapped men, apparently because they did not realize the seriousness of the situation, to take the steps that quite probably could have kept them alive.

A source of ignition is of course the prime ingredient in a fire or explosion. Thus, in planning on the basis of lessons learned from this disaster, it becomes necessary to look once again at electric power, and particularly at open overhead systems along which, among other things, a blaze can get a roaring start before it is discovered. Also, it may occur in key openings which, if closed, might eliminate all escape routes.

The practical answer, includes, of course, haulage and other equipment which does not require open wires—for example, the diesel locomotive and AC for face service. Though it seems unlikely that electric power can be eliminated there is the possibility that some such development as hydraulic mining, with something other than electric haulage, could simplify electrical use and thus reduce the hazards.

But in spite of all reasonable precautions the chance of fire or explosion cannot be ruled out. So, it becomes logical to provide as many opportunities for escape as possible. There should be no stinting on alternate escape routes and they should be kept in a condition that permits easy travel. With these and other improvements to physical plant the human element moves into the foreground. Those who go underground to work should be thoroughly familiar with the escapeway system and how to use it, and equally important, with what to do if accidentally trapped.

Again, as in many other things, the job is thinking and proceeding logically.



AERIAL VIEW of O'Donnell No. 2 shows mine cars crossing storage bins (center), preparation plant at right, shop and supply house above bins. Mine fan is at left. Most of site was carved out of steep hills in narrow ravine.

O'Donnell No. 2 builds up production of Fairmont coals as . . .

R&P Girds for the Future

Rochester & Pittsburgh Coal Co., with reserves sufficient for more than 78 yr at present rate of extraction, develops new mine and plant to provide high-quality coal to metallurgical, utility and other uses.

By A. E. Flowers
Associate Editor, Coal Age

HIGH PRODUCTIVITY in mining and preparation plus a product in demand are important reasons why O'Donnell No. 2 mine enhances Rochester & Pittsburgh Coal Co.'s position in metallurgical, utility, industrial and retail markets.

Located at Sand Fork, W. Va., and now in the development and expansion stage, O'Donnell No. 2 is scheduled to produce 800,000 tons in 1960, and R & P. will boost production to 1,200,000 tons in 1961. Going on line Sept. 1, 1959, O'Donnell No. 2 has reserves for 50 yr at an annual rate

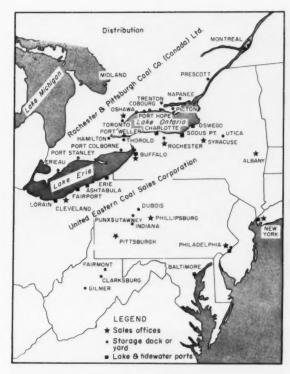
of 1,200,000 tons. This new tonnage from the Pittsburgh seam puts R. & P. in a position to offer 2,400,000 tons of top-quality Fairmont coal to customers in the Eastern market. All of O'Donnell No. 2 production is sold by the United Eastern Coal Sales Corp., a wholly-owned subsidiary of R. & P.

Up to the time Q'Donnell No. 2 went on stream R. & P. relied on its O'Donnell No. 1 mine, Four States, W. Va., for 1,200,000 tons of Pittsburgh coal. But this was not enough to meet the growing demand for high-quality Fairmont coal Furthermore, it would have been difficult and expensive to expand production at O'Donnell No. 1.

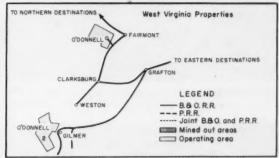
Developing the Mine

Preliminary development work began in 1955 when the company initiated a core-drilling program to prove the reserves. Because of the rugged mountain terrain and the need to build a railroad extension to the property, R. & P. management chose a plant site on the Little Kanawha River 1 mi from Sand Fork. To reach this site, the B. & O. R. R. extended its track 5½ mi from Gilmer Station.

Aside from facing the problem of building a preparation plant and assorted mine buildings in rugged terrain, the company had to plan the new mine openings to eliminate the possibility of flooding by the nearby river. Records showed that the average elevation of the river was 714 ft above sea level and the highest-known flood level was 742 ft. To provide a comfortable margin above this high-water, mark, R. & P engineers staked out the portal openings at an elevation of 760 ft.







R. & P. in Pennsylvania

Ernest No. 3 mine and preparation plant, Ernest, Pa.— Upper Freeport seam, drift mine, 4,500 tpd capacity, B. & O. and Pennsylvania R. R.; utility, industrial and metallurgical markets.

Kent No. 3 mine, Kent, Pa.—Upper Freeport seam, strip mine, 1,000 tpd capacity, B. & O. and Pennsylvania R. R.; industrial markets.

Lucerne No. 3 mine and preparation plant, Lucernemines, Pa.—Upper Freeport seam, drift mine, 5,000 tpd capacity, B. & O. and Pennsylvania R. R.; utility, industrial and metallurgical markets.

Kent No. 8 mine, McIntyre, Pa.—Upper Freeport seam, drift mine, 900 tpd capacity, B. & O. and Pennsylvania R. R.; utility, industrial and metallurgical markets.

Kent No. 4 cleaning plant, Clune, Pa.—Receives coal from various Kent mines, 800 tpd, B. & O. R. R.; utility and industrial markets.

Kent No. 10 mine, McIntyre, Pa.—Upper Freeport seam, drift mine, B. & O. and Pennsylvania R. R.; 1,800 tpd, coal

prepared at Kent Nos. 1 & 2 cleaning plants; utility and industrial markets.

Kent No. 11 mine, McIntyre, Pa.—Upper Freeport seam, driftmine, B&O and Pennsylvania railroads, 750 tpd. Coal prepared at Kent Nos. 1 and 2 cleaning plant.

Kent Nos. 1 & 2 cleaning plants, McIntyre, Pa.—Processes coal from Kent Nos. 8 and 10, 4,800 tpd, B. & O. and Pennsylvania R. R.; industrial, utility and metallurgical markets.

Margaret mine, Margaret, Pa.—Upper Freeport seam, drift mine, 1,400 tpd, B. & O. R. R.; industrial markets.

R. & P. in West Virginia

O'Donnell No. 1 mine and preparation plant, Four States, W. Va.—Pittsburgh seam, shaft mine, 5,500 tpd, B. & O. and W. Md. R. R.; retail, industrial and utility markets.

O'Donnell No. 2 mine and preparation plant, Gilmer, W. Va.—Pittsburgh seam, slope mine, 4,000 tpd, expanding to 5,500 tpd, 30-yr reserves at planned rate of 1,200,000 tons per year, B. & O. R. R.; retail, industrial, utility and metallurgical markets.

From this 760-ft elevation the company drove three 800-ft rock tunnels downward on a 4.3% grade to tap the coal seam. All three openings are 14 ft wide. The return airway is 9 ft high, the main haulway is 7½ ft and the third opening is 6½ ft.

Employing a Joy 11-BU loader, two 10-SC shuttle cars and a 10-RU cutter when soft streaks permitted cutting, six-man crews advanced the openings at a rate of 16 ft per day. The slope crews also installed 5-ft wedge-type roof bolts as part of the work cycle. After reaching the coal

these two crews drove three headings.

But the development schedule received a setback when the three headings ran into a sandstone roll, which turned out to be 320 ft thick. By the end of 1957, however, all three headings were through the roll and the company pushed main-entry development. The three headings were expanded to five and the equipment used in rock work was replaced with 440-V AC machines, including a Joy 11-BU loader, 10-RU cutter, two National Mine Service Torkars and

a self-propelled Acme Jumbolter.

To speed development of the mains, production units worked around the clock. Management's goal was to have the necessary territory developed by the time the new Heyl & Patterson washing and drying plant was completed.

To handle coal during the construction period, R. & P. built a temporary tipple 1% mi from Gilmer Station. The company stopped mine production on March 1, 1959, to permit some key construction on the new preparation plant. By the end of the



AC POWERED mining equipment is used exclusively at O'Donnell No. 2. Initial main-entry development was done with conventional equipment. Power is carried underground at 4,160 V to substations within 1,100 ft of face.



ROOF BOLTING with air-powered drills and impact wrenches is an important part of the O'Donnell No. 2 face cycle.



SHUTTLE CAR with torque-converter drive hauls coal from the face to steel mine cars matching its 8-ton capacity.



SUPERVISORS include Thomas Zirkle (left), section foreman; K. D. Albaugh, superintendent, and Raymond Bragg, mine foreman.

miners' vacation, this work was completed and mining equipment went back into service.

As soon as the new preparation plant was ready for full-scale operation management added a second off-track production unit, including a Joy 14-BU loader (later replaced by a 15-BU), two National Mine Service Torkars, 10-RU cutter and Acme Jumbolter. These two offtrack sections carried the production load until October, 1959, when a Joy Twin Borer was added to drive main headings.

Production comes from the Pittsburgh seam which is 6½ to 7½ ft thick over all. There are some clay veins cutting through the seam but



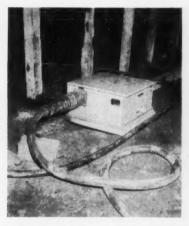


NEWEST MACHINE for producing coal is boring-type continuous miner with two boring arms and two sets of trim chains.

Cutting pattern is shown in photo of coal face at right. Width and height of cutting may be varied.



LOAD CENTER reduces 4,160-V power to 440 V for operation of face equipment.



SEPARATE circuit center protects continuous miner, A 4/0 cable powers miner,



DISTRIBUTION BOX has individual outlets for conventional face machines.

they are not a major problem. Because of the characteristic weak draw rock covering the coal, and the poor quality of the top part of the seam, the company leaves the top 6 to 8 in of coal in place.

Section Crews

Standard crews in conventional sections include the following:

One loader operator.

Two shuttle-car operators.

Two cutters.

Two bolters.

One shotfirer.

One canvasman.

Two muckers.

One mechanic.

One foreman.

The continuous miner crew includes:

One miner operator.

Two shuttle-car operators.

One bolter and canvasman.

One utility man.

One mechanic.

One foreman.

Producing the Coal

In conventional mining the universal machine top cuts the coal and shears the right rib of the Nos. 1, 2, 4 and 5 headings. It makes an additional shear along the left rib in the No. 3 heading, which serves as the main haulway. Employing a 9-ft bar equipped with Kennametal U7 bits,

the cutter makes kerfs 7½ to 8 ft deep. After completing the shearing job, the cutting crew uses a Schroeder hydraulic drill equipped with a Cardox auger and Kennametal bit to place four shotholes. Three of the holes are located near the bottom of the coal and the fourth about half way up in the same and near the unsheared rib.

Each of the bottom holes receives five sticks of 1½x8 du Pont AA permissible powder and a No. 6 cap. The upper hole receives only three sticks of powder and a cap.

Shuttle cars discharge directly into 8-ton Sanford-Day dropbottom mine cars. Equipped with Willison auto-

Milestones in R. & P. History

The R. & P. story begins in the latter part of the 1870's when Franklin Platt and his brother, W. G. Platt, found coal in Jefferson County, Pennsylvania. They enlisted the financial support of Walston H. Brown, New York financier, for the acquisition and development of the properties. Mr. Brown also acquired control of the Rochester & State Line R. R. and consolidated it with a number of short line roads in the area to form the Rochester & Pittsburgh R. R. Co.

The railroad company then subscribed to all the stock of the newly formed Rochester & Pittsburgh Coal & Iron Co., which enabled the company to purchase 5,862 acres of coalbearing land in 1881. Extension of the railroad to serve these properties was begun early in 1882. Franklin Platt was placed in charge of development.

Both companies encountered many changes in fortune in their early years and soon the railroad went into receivership. Its property, including all stock of the Coal & Iron Co., was purchased in 1885 by Adrian Iselin, an investment banker of New York City. He reorganized the railroad and it eventually became the Buffalo, Rochester & Pittsburgh Ry. Co. It continued to own the stock of the coal company until the end of 1906 when, in anticipation of the effective date of the amendment to the Interstate Commerce Act which prohibited railroads from transporting commodities in which they have an interest, it transferred its interest in the stock of the mining company to Mahoning Investment Co., which was formed for this purpose. The stock of the Mahoning Investment Co. thereupon was distributed to the stockholders as a dividend.

In 1928 the Van Sweringen brothers, of Cleveland, acquired the interest of the Iselins in the railway company. It was subsequently sold to the B. & O. R. R. in 1929 and is now the Buffalo division of that road.

Franklin Platt continued in charge of mining properties and, with adequate financial support from the Iselin interests, Rochester & Pittsburgh Coal & Iron grew and prospered. By 1895 its coals were well established, it had developed a profitable outlet for its fine coal in the form of coke manufactured in more than 1,000 ovens, and production had climbed to 1¾ million tons annually.

In the early years most of the company's production was marketed through sales agents and wholesale coal distributors. About 1920, the company began selling direct to consumers and expanded its sales department accordingly. Today, marketing is done by two wholly owned subsidiaries, Rochester & Pittsburgh Coal Co. (Canada) Ltd. and United Eastern Coal Sales Corp. The principal sales offices are Toronto and New York respectively. Branch offices are maintained in Albany, Buffalo, Cleveland, Philadelphia, Pittsburgh, Rochester, Syracuse, Montreal and Port Colborne.

As consumption of coal in the United States increased, coal reserves and output of Rochester & Pittsburgh Coal & Iron expanded with it. Additional coal lands were acquired in Armstrong, Clearfield and Indiana Counties, Pennsylvania, where new mines were opened.

New corporations were formed to develop and operate many of the new properties. The banking firm of A. Iselin & Co. furnished the money to purchase these lands and title to them was taken in the name of Adrian Iselin. After assembling sufficient acreage for one or more mines a new corporation then would be formed. By successive steps, culminating in 1939, the several operating companies were consolidated to form the present Rochester & Pittsburgh Coal Co., and the picture was completed in 1950 by merging the Mahoning Investment Co. into it. Ownership of a majority of the stock continues in the Iselin family.

Throughout its history R. & P. has equipped its mines with the latest and most efficient machinery available. As early as 1895 more than half of its output was produced by "machine mining" with punching machines. It was one of the first companies to introduce electricity into coal mines, and to install electrically-driven cutting machines, locomotives for underground haulage, pumps and fans. Today its operating mines are fully equipped with modern equipment, including the latest types of continuous miners for producing coal and modern preparation plants designed to yield the best possible products.

Up to 1948 all of R. & P.'s production came from mines in Pennsylvania. In that year the company acquired a going mine, renamed O'Donnell No. 1, in the northern West Virginia field. In 1956, R. & P. added to its West Virginia reserves by leasing a large acreage near Gilmer. This new property is now tapped by O'Donnell No. 2.

In the first 78 yr of its existence R. & P. has produced more than 345 million tons of coal and owns unmined reserves sufficient for more than another 78 yr at current rates of production.

matic couplers, these cars are handled by a hydraulic car spotter. Since each mine car holds a full shuttle-car load of coal, the company eliminates the need for a transfer device between cars.

Mine cars travel by the loading point in No. 3 heading on track loops extending from No. 2 to No. 4 heading. Up to 30 cars can be handled on the empty side of the loop. New loops are installed each 300 ft of entry advance. Because of the adverse grade two 20-ton Jeffrey locomotives are employed to move a 12-car trip of loads from the section to the main side-track.

Boring-type continuous miners also

drive five headings per entry but breakthroughs are cut 60 deg with the headings.

The crawler-mounted boring miner has two boring arms and two sets of trim chains, one of which cuts an arch for better roof control. The miner's full cut varies from 5 ft 11 in to 7 ft 11 in high and 11 ft 8 in to 12 ft 8 in wide.

Boring-arm diameters can be changed in 4-in increments from 6 to 7 ft by using arms of different lengths and raising or lowering the main transmission 2 in for each change. Additional heights up to 12 in are cut with the upper trim chain, which may be raised hydraulically to the

desired position as the machine bores ahead.

Two 100-hp continuous-duty main motors provide power to the main boring transmission. Two 15-hp conveyor motors and a 30-hp pump motor bring the total up to 260 hp. Weight of the machine is 40 tons.

An ammeter near the operator's controls indicates the main motor current and thus shows the cutting resistance. It serves as an accurate guide to establishing the best cuting rate for the condition.

Rope Haulage

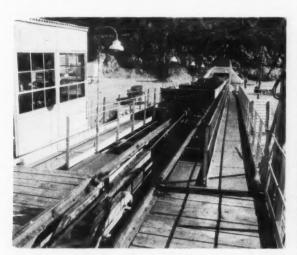
An Ottumwa hoist, driven by a 600-hp motor and carrying 7,500 ft



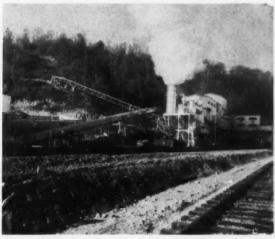
CONTROL CENTER for slope hoist, located beside bins, has closed-circuit television so operator can observe hoist drum.



ELECTRICALLY CONTROLLED door trippers make it possible to dump coal or rock in proper bins as trip moves.



DROPBOTTOM CARS carrying 8-ton payloads come to surface in 12-car trips, discharge while moving across 100-ton bins.



ALUMINUM-CLAD preparation center on site carved out of the mountainside is designed to process 400 tph of coal.

of Bethlehem wire rope on its drum, pulls coal to the surface in 12-car trips. The 1%-in hoist rope is coupled to the trip of loads at the 1,200-ft-long sidetrack 3,500 ft from the portal. Because of the 3.65 to 4.3% grade against the loads, R. & P. employs a 6-wheel locomotive at the rear of each trip.

The hoist controls are housed in a small steel building beside the coal and rock bins. From this building the operator has a clear view of the cars as they come out of the portal and move across the bins. A Dage closed-circuit television system enables the hoist operator to watch the hoist drum from his control booth beside the bins.

An unusual combination of targets

on the mine cars and electrically controlled door trippers makes it possible to dump either rock or coal into the proper bin without slowing the trip. The system works like this:

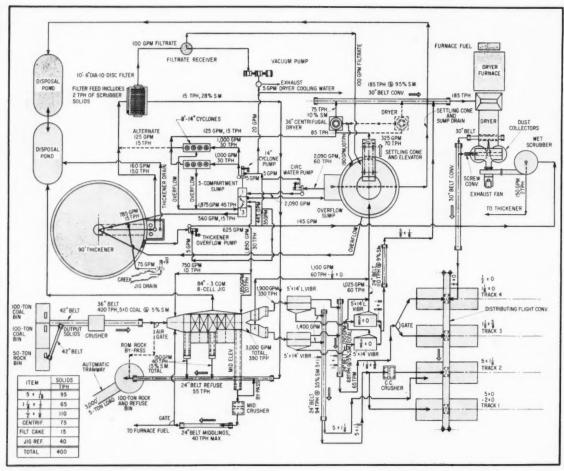
As cars come across the in-line bins the car targets contact either coal or rock tripper switches. Targets are put in the proper position by the loading point operator.

If a car is filled with rock the target is put in the down position so that it will contact a lever on the first of two microswitches. This switch sets in action a hydraulic system which lowers the coal trippers. When the rock car's target hits the second microswitch, the hydraulic system raises the coal trippers to the nor-

mal position. Thus if the next car carries coal it will be emptied in the coal bin.

The rock car continues across the coal bin and as it approaches the rock bin the car's target hits another microswitch which sets in motion the hydraulic system to raise the rock tripper. After dumping the rock and moving across the bin, the car approaches the second rock-dump microswitch and the rock trippers return to the down position.

In normal operation the coal trippers remain in the up position. After a rock car passes over the coal bin the coal trippers return to the up position. Thus the trippers are controlled by each car and make it pos-



COAL FLOW at O'Donnell No. 2 includes raw-coal crushing to 5x0, jig washing, mechanical dewatering and thermal drying. Plant operation is handled by six men, including jig and dryer operators, car loader and three utility men.

Average Analyses (As Received), O'Donnell No. 2 Coals For February 1960

Size	Moist.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Btu	Fusion Temp.
5 x 1 1/8	3.3%	39.4%	50.9%	6.4%	1.20%	13,550	2280 F
11/8 x 5/8	3.1%	38.5%	52.2%	6.2%	1.3%	13,570	2250 F
5/8 x 0	2.9%	38.6%	52.5%	6.0%	1.15%	13,680	2270 F

sible for any mixture of rock and coal cars to be dumped while moving in a string.

The hoist operator repositions all targets on rock cars to the normal setting for hauling coal. He also retracts, by pushbutton controls, the normally up coal trippers as the empty cars move back to the mine. If for any reason the automatic system for positioning the trippers should fail, the hoist operator can activate any tripper by pushbutton from his control room. The hoist operator also

controls the individual feeds from the two 100-ton coal bins for blending plant input.

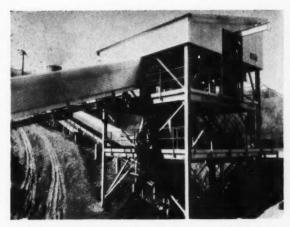
Power

R. & P. buys power from the Monongahela Power Co. at 22,000 V and splits it into two circuits, one for underground and one for the preparation plant. The mining circuit is stepped down to 4,160 V by a 600-kva substation on the surface. This unit will be replaced by a 2,000-kva

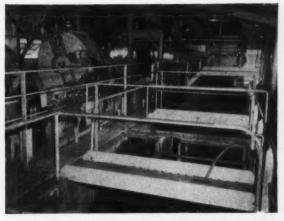
substation when the mine gets up to full production.

The 4,160-V power passes through a General Electric oil circuit breaker and then is carried underground by General Electric 1/0 3-conductor cable with a built-in ground-continuity check circuit. Suspended from the mine roof 18 in from the trolley wire, this cable is made up in 1.000-ft lengths joined by high-voltage couplers. It extends to within 1,100 ft of the face, where it terminates at a General Electric 300-kva dry-type load center that steps the voltage down to 440 for operating equipment. The last 1,000 ft of the cable leading to the transformer load center is Type SHD, which is more flexible and thus is easier to handle.

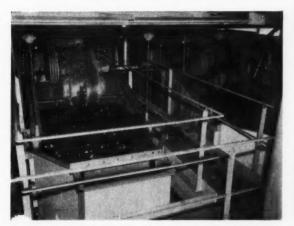
From the load center, 600 ft of 250,000-cir mil cable carries 440-V power to an Ensign distribution box. This unit serves the cutter, loader,



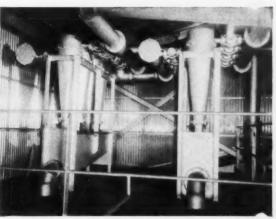
PRIMARY CRUSHER receives coal from raw-coal bins, breaks it down to 5x0 before delivering it to belt feeding plant.



JIG receives 5x0 feed by sluice, makes three-product separation into clean coal, middlings and refuse.



TWO VIBRATORS dewater and size clean coal into 5x\%, 1\%x\% and \%x0 products. The \%x0 is rescreened.



BATTERY of six 14-in cyclones receives overflow from tank, concentrates solids for delivery to filter or centrifuges.

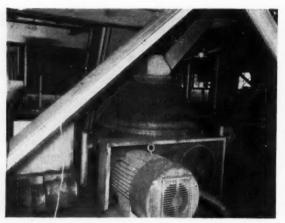
bolter and shuttle cars. Continuous miners have their own 250,000-cirmil cable extending from the load center to a Joy Safety Circuit Center. A 4/0 trailing cable, 500 ft long, leads from the safety center to the continuous miner.

Other features of the underground AC system include: oil circuit breakers at the mouth of each entry off the mains; independent continuity-check circuits for each branch circuit; ground-fault relaying system for each trailing cable; and backup ground-fault relay on the load-center secondary.

Power for the preparation plant is transmitted at 22,000 V to a 2,500-kva transformer which is incorporated in a General Electric unit substation. This unit reduces voltage to 440 for operation of the plant, which has 1,800 connected horsepower. The unit substation includes a main cir-



THICKENER, 90 ft in diameter, removes solids from circulating water flowing in at the rate of 785 gpm. Flocculant speeds settling of solids. Overflow returns to plant and is reused.



CENTRIFUGAL DRYERS dewater 1/8x0 coal before it joins 1/8x1/8 traveling to fluid-bed heat dryer on a 30-in belt.



DISK FILTER removes solids from cyclone underflow. Filter cake is delivered to the refuse bin.



INSTRUMENTS on panelboard provide the operator with necessary information on dryer performance.



OUTSIDE FOREMAN A. H. Whaley uses plant communication system to keep in touch with various centers of activity.

cuit breaker on the secondary side and six other circuit breakers that feed power to the various load centers in the plant.

Only the underground haulage and mine pumps use DC power. A 500kw synchronous converter installed on the surface provides 550-V DC power.

Preparing the Coal

Raw coal feeds from the storage bins to a 42-in belt which discharges into a McLanahan & Stone 30x60 Rockmaster single-roll crusher making a reduction to 5x0. The crusher product discharges onto a 36-in belt leading to a sluice feeding an 84-in 3-compartment 8-cell Jeffrey Baumtype jig. Rock also may be fed separately to the crusher when coal is not flowing to the plant and then diverted through an air gate to a 100-ton refuse bin.

Reject material from the first two jig compartments is elevated to a 24-in belt which discharges it into the refuse bin. Middlings flow to a Gundlach two-stage crusher that reduces it to 1x0. Part of the crushed middlings is consumed for heat drying and plant heating. The remainder is recirculated to the jig.

Clean coal splits into two streams and flows onto two 5x14-ft double-deck Low-Head vibrators equipped with Tyler woven-wire screens. These units make a separation into 5x1½, 1½x5½ and 5x0 sizes. The 5x0 continues to a pair of 5x14-ft single-deck Low-Head vibrators equipped with Bixby-Zimmer wedge-shaped screen cloth for further dewatering and sizing into 5x1½ and ½x0 fractions.

The 5xx product flows to a 24in belt feeding a 30-in belt that carries coal to the Heyl & Patterson fluid-bed dryer. The 5x0 passes to a settling cone from which concentrated solids are elevated to two Reineveld centrifugal dryers. The mechanically dried coal joins the 5%x 1/8 on the 30-in belt and flows to the fluid-bed dryer.

Dried %x0 coal passes to a 30-in belt which discharges either directly to cars on Track 4 or onto a distributing conveyor spanning four-tracks.

Effluent from the settling cone flows to a sump from which it is removed by a 6x8 Goyne pump and delivered to the first section of a three-compartment head tank. Another 6x8 Goyne pump taps the first compartment as a source of feed for a battery of eight 14-in Heyl & Patterson cyclones.

The cyclone underflow may be sent to (1) a 10-disk Dorr-Oliver filter and then to the refuse bin, or (2) piped to the Reineveld centrifuges.

Cyclone overflow returns to the

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a scale, our first one.
an imagination of iron, brass, copper and lead,
fashioned in a New England workshop.
inanimate.

but it spoke—
a different kind of language,
of pounds and ounces and fractions thereof
and it spoke only the truth.

us jett—
the roundness of grain, the smoothness of marble,
the sweetness of candy and the authority of gold.

it heard—
the sound of life, babies newborn
it cradled them and recorded their growth
until pounds and ounces were replaced
by years and months.

it traveled—
by packet boat down the Mississippi,
by clipper ship to England,
The Sandwich Isles, the Indies,
South America and China.
better known throughout the world
than anything else made in America.

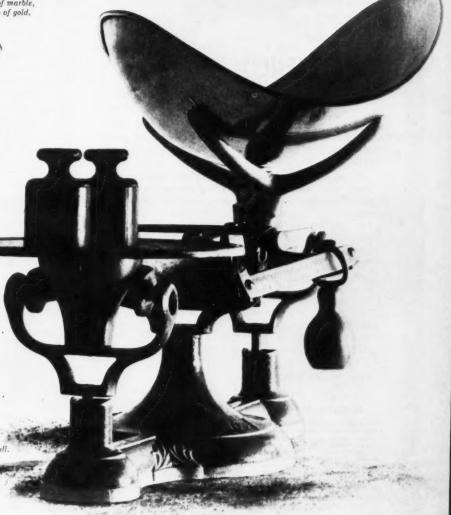
it was relied on by farmers, merchants, scientists and doctors, it witnessed history; influenced it and was part of it.

its descendants have new names. floarial dial, mercoid switch, reed switch and cotton lap; remote control, printomatic, electronic and levetronic. all serve to evaluate and control the substances that make up the universe.

raw materials or manufactured articles; things unseen or man himself; all have weight and must be measured . our scales do the job.

and the new challenge—
weight in motion . . .
freight trains in transit,
trucks too busy to stop,
liquids coursing through miles of pipe . . .
our scales will do the job.

but this was our first— Fairbanks No. 1 and we hold it in special reverence for it weighed the most precious thing of all it weighed an idea.



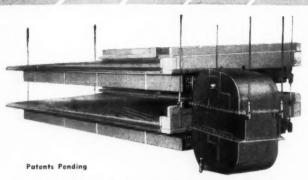
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CONCENCO® "77" Table Effects Enormous Economies

Employing two identical decks, one over the other, the CONCENCO "77" Table washes twice as much coal in a given unit of space as the conventional single deck table.

And, because the twin decks and the synchronized head motion are in floating suspension, impact to the building is greatly reduced, making lighter, less expensive new building construction possible. But, before any new building construction becomes necessary, your present coal washing capacity can be greatly increased, up to twice as much, in your present floor area.

The economies are obvious, not only is there a great saving in power and construction cost, but feed and product circuits as well as other facilities serving the tables are cut in half. Thus each such facility now accommodates the operation of two decks at considerably reduced installation cost although production is doubled.

For full information about this highly efficient table, send for Bulletin 77.

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third compartment of the three-section tank. By regulating the underflow from this compartment to a 90-ft Dorr-Oliver thickener, R. & P. controls the volume of solids in the circulating water. Overflow from the third compartment passes to the second compartment of the tank and is used for jig recirculating water. Four Dorr-Oliver ODS pumps push thickener underflow to the disk filter.

Thickener overflow is returned to the plant as fresh water by a 4x6 Goyne pump that has its suction 4 ft from the top of the thickener. River water also is pumped into the thickener as makeup. To speed settling of solids in the thickener, R. & P. adds Dow Separan as a flocculant.

The clean 5x1% and 1%x% products from the dewatering and sizing vibrators flow on separate belts to the car-loading area. The 5x1% discharges onto a movable belt boom which may be raised to discharge coal into a Gundlach crusher for reduction or lowered into the railroad car.

Operation of the 400-tph plant requires only six men plus a foreman. Three men—jig operator, dryer operator and car loader—handle actual plant operation while the other three clean and drop cars and handle plant maintenance.

Although O'Donnell No. 2 coal is comparatively new on the market, company officials report that customer reception has been so good that the mine is being crowded to expand production fast enough to meet the growing demand. Shortly after the mine went into production, the company had a series of coking tests run. Test results showed a 28.7% shrinkage on the coking process and formation of a strong coke. These two properties, plus a sulphur content of from 1.3% down to 0.8%, make the coal desirable for metallurgical use. Originally planned to serve the industrial, retail and utility markets, O'Donnell No. 2 now will divert part of its output to the metallurgical market. The major portion of the production, however, will be sold to utility and industrial customers.

To keep a constant check on plant performance and quality of the coal being shipped, R. & P. samples and analyzes each size daily for moisture and ash content. This work is done at the mine in the company's laboratory. Complete proximate analyses are made at R. & P.'s main laboratory in Indiana, Pa.

NOW! A SCREEN WITH A

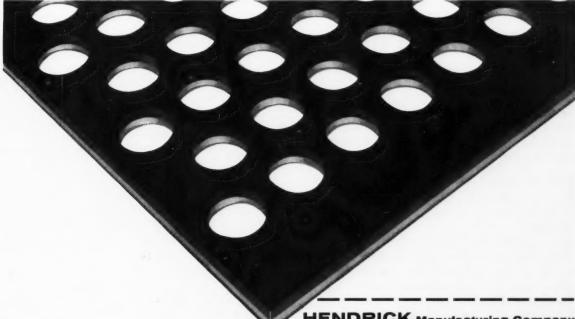
HENDRICK RUBBER CLAD PERFORATED METAL is now available with a specially designed rubber covering. Ideal where extreme abrasion is a problem, rubber clad Hendrick Perforated Screens assure far less plate wear. Large chunks of ore, coal or stone hit the screen with a fully cushioned shock . . . the rubber coating also takes the brunt of wear by protecting the steel plate underneath. The rubber laminate is bonded to steel by a new adhesive and vulcanized under controlled heat.

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Minnehaha Mine averaged 2700 tons of raw coal per day with two units of Jeffrey equipment working two shifts per day over a period of 22 months.

"Performance miraculous; costs reasonable"

Impressive results with Jeffrey equipment—drilling machines, shuttle cars, loading machines, cutting machines—are reported by the Minnehaha Mine of Fairview Collieries Corp., Sullivan, Ind. Management states that maintenance costs have been exceptionally low—and performance way beyond expectation.

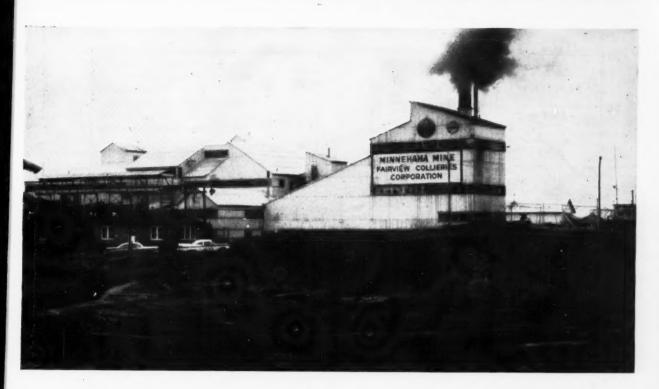
SYSTEM PLANNING—The wide range of Jeffrey equipment in use was chosen on recommendations of an experienced Jeffrey sales engineer. While each unit is a solid performer itself, it takes experience to match and integrate the various pieces of equipment to give top performance of the whole mining system. Jeffrey analyzes the complete job—and comes up with recommendations to help you realize low-cost production.

ONE-STOP SERVICE — Standardizing on Jeffrey equipment streamlines maintenance and ordering of renewal parts, too. Minnehaha gets topnotch service from the Jeffrey warehouse in Evansville. Here, replacement parts are stocked for immediate delivery.

Use the Jeffrey system-planning approach—you'll find it pays off. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



Jeffrey 70-UR Cutting Machine.

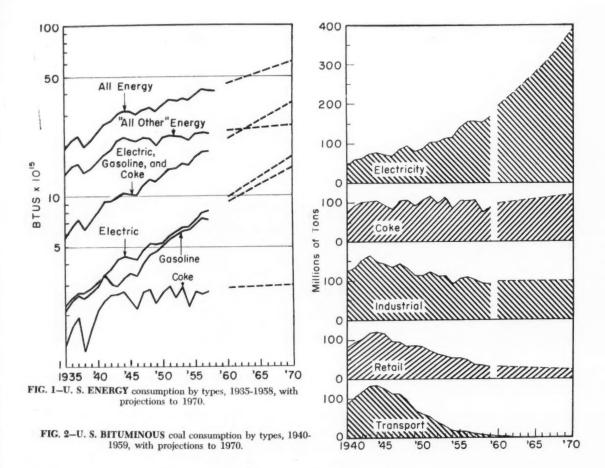


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TRANSMISSION MACHINERY... CONTRACT MANUFACTURING





Estimating Long-Term Growth and Annual Variation in . . .

Bituminous Coal Consumption

Two mineral economists look at coal's growth in the next decade, set up some mathematical formulas for forecasting annual consumption and showing the relationship of bituminous consumption to the general economy.

By W. Gibson Jaworek, Graduate Assistant, Department of Mineral Economics, and

John J. Schanz Jr., Associate Professor, Department of Mineral Economics, The Pennsylvania State University, University Park, Pa. IT HAS BECOME APPARENT in recent years to those intimately concerned with the future of the American fuels industries that the growth in demand for energy has become a topic receiving considerable attention, and that investigators are leaning more and more toward a mathematical approach to deduce what pattern that growth will follow. Though coal has been included by necessity in all studies of future energy markets, it has not been the subject of mathematical analysis or description as frequently

as has been total energy or some of the other fuels, particularly petroleum.

It is the intent in this paper, to subject bituminous coal consumption to a preliminary mathematical scrutiny which can lead to a more logical estimation of the general level of bituminous coal consumption for the next decade, as well as formulating an approach toward describing how coal consumption may vary as the result of the annual variations in activity in the United States economy. The approach utilized is more sophisticated

Mineral Industries Experiment Station Contribution No. 59-41. The investigation was part of a research program supported by the Mineral Conservation Section of the University.

than the mere projection of the historical trend of bituminous coal consumption. Such a projection would lead to a continuation of the recent decline, indicating that coal consumption would reach zero some 30 yr from now. On the other hand, the mathematical analysis described here is a relatively simple, straightforward approach and is not intended to represent the ultimate in mathematical economic analysis as now practiced. It is hoped that this will contribute to our knowledge of bituminous coal markets. Even more, it is hoped that it will help arouse a greater interest in utilizing mathematical and statistical analysis when studying the bituminous coal industry. Since this is a preliminary study, comments and criticisms are anticipated.

Changing Patterns of Energy Demand

Any forecast of bituminous coal consumption must be in adjustment with the total demand for energy. The demand for coal is not an independent factor in the United States economy, but rather it reflects the distribution of the total demand for energy among the various energy sources. If the demand for energy declines, coal demand can only grow at the expense of the other fuels. Similarly, if total demand for energy increases, coal will benefit from greater sales only so long as it maintains or increases its share of the energy market. Consequently, an examination of the demand for coal must be preceded by a decision concerning the total demand for energy in the future.

In the postwar period, there has been a striking change in the behavior of certain components of the total demand for energy. Figure 1 shows quite clearly that all energy consumption sectors were following a similar growth pattern in the 1935 to 1945 decade. However, from 1945 to 1957, only electricity and gasoline consumption continued their upward sweep. During this same period, coke consumption and the collective total consumption of all other energy uses flattened out and increased very slowly. Consequently, virtually all of the increase in energy demand of the last 15 yr can be attributed to the rapid increase in the consumption of electricity and gasoline. Fortunately, detailed statistical information is avail-

TABLE I—Bituminous Coal Consumption From 1948 to 1958 With Projections to 1970 (In Thousands of Tons)

Year	Coke	Electric	Industrial	Retail	Trans- port	Total Consumption
1948	107,306	95,620	132,799	86,794	97,380	519,909
			115,124			
1950	103.845	88.262	114,662	84.422	63,011	454,202
			122,955			
			111,172			
			112.091			
			92,022			
			150,493			
			109,517			
			102.773			
			96,896			
1959			93,000			
	(est.)	(est.)	(est.)	(est.)	(est.)	(est.)
1960	100,000	197,000.	100,000	31,000		428,000
1961	102,000	209,000	100,000	30,000		441,000
1962	104.000	225,000	100,000	29,500	—	458,500
1963	106,000	242,000.	100,000	29.000	—	477,000
			100,000			494,500
1965	110.000	277.000.	100,000	28,000	—	515,000
			100,000			536,500
			100,000			557,000
			100,000			576,500
			100,000			602,000
			100,000			631,000

Source of Data-Data for 1948 to 1958 from the U.S. Bureau of Mines.

able for these two markets, and for coke consumption as well. At their present rate of growth, the combined markets for gasoline, electricity, and coke will surpass by 1963 the total consumption of energy in all other uses.

The "all other" energy market is a difficult area to investigate because it is made up of a large number of relatively small uses for which statistical information is both inadequate and irregular. The major components of this "all other" group are industrial heat (excluding coke), propulsion (excluding gasoline), commercial fuel, and residential fuel. The sharp break in the growth pattern of this group at the end of World War II can be accounted for by a combination of several circumstances. First, the shifting of industry to a greater use of electricity and the improved efficiency in the direct use of fossil fuels. Second, the introduction of more efficient combustion equipment and practices into residential and commercial heating. Third, the almost total conversion of the railroads from steam locomotives to the far more efficient diesel. As a result, consumption by most of the consumer types in the "all other" category showed either small gains or actual declines between 1945 and 1957.

Total United States Energy Demand 1959-1970

It is customary to assume in predicting future energy requirements that the energy demand will depend upon the growth of economic activity in the nation. Certainly it is unrealistic to consider energy demand as the independent variable with economic activity dependent upon it. This latter case would only become true if there was a shortage of energy supplies or they became extremely high in price. Neither of these situations is expected in the next decade.

In projecting the future demand for energy, there are several techniques commonly employed. Among these are energy demand correlated with gross national product projections, energy demand as related to projected population size, summations of projections of the individual types of energy use, projections of work output converted to the required energy input, and the direct projection of total energy demand. Several of these methods are frequently further refined by the initial use of per capita data.

Regardless of the methods used, the various predictions made in recent years have two things in common. First, they indicate the future demand for energy in the United States is go-

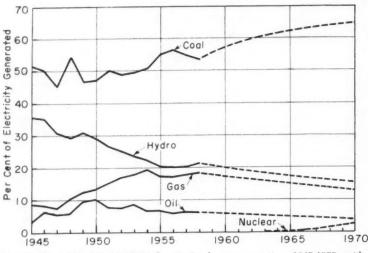


FIG. 3-SOURCES OF ENERGY for U. S. electric generation, 1945-1958, with projections to 1970.

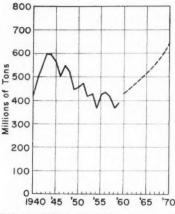


FIG. 4—TOTAL U. S. bituminous coal consumption, 1940-1959, projected to 1970.

ing to become extremely large. In fact, the growth indicated is so great that many analysts have been inclined to reduce their predictions by one means or another to avoid what appear to be unbelievably large numbers. Second, regardless of method, most of these projections bear a remarkable similarity in results. In fact, since these are primarily projections from past experience and cannot possibly be considered precise measures of future energy demand, the difference in predictions by various authors is probably less than the probable reliability range of the individual predictions of these authorities.

In view of this, the projection of total energy demand utilized shown in Figure 1 is a simple least squares straight line on semi-log graph paper utilizing the postwar data. This is in sufficient agreement with far more detailed analyses of energy demand by other authors to meet the requirements of an investigation which intends to concentrate on bituminous coal demand. However, it is important to examine the behavior of the individual types of use which make up this total. In particular, consumption of coke and production of electricity need close attention. The projection of gasoline consumption is obviously of little importance to coal, and the projection of "all other" energy is not too critical either, as will be explained below.

As a first step, the energy needed for the future production of electricity was determined by utilizing *Elec*-

trical World's1 most recent estimation of electric power production. This is a highly reliable figure since much of the power will be produced from units already under construction or planned. The kilowatt hours of electricity have been converted to Btu's using the current steam power plant coal equivalent. The second step was to project the demand for coke. This was based primarily on estimates of future pig iron production, with an appropriate correction for the gradual decline in pounds of coal required per ton of pig iron produced. The projection presented in Figure 1 is in reasonable agreement with other estimates of future coke requirements made in recent years.2

Gasoline consumption was proiected by using the average rate of growth of the past ten years. Finally, the future consumption of "all other" energy was established by subtracting the combined energy consumption of electricity, gasoline, and coke from the total energy demand. Not too surprisingly, this results in a continuation of the very slow growth exhibited since 1945. If there is a continued improvement in the efficiency of industrial fuel combustion and a steady shift to greater reliance on electricity, a rapid expansion in "all other" energy consumption is not to be expected in the future.

2. 1937. 2 See Teitelbaum, P. D., Nuclear Energy and the U.S. Fuel Economy, National Planning Association, Washington, D. C., July 1958, page 112.

Trends in Bituminous Coal Consumption

Now that the future pattern for total energy has been established it is possible to turn attention to the primary objective, that of determining bituminous coal's share of that total. To accomplish this, each of bituminous coal's individual markets will be examined and projected individually, with the total of the individual components providing the total demand for bituminous coal.

Attention is directed first toward the future prospects in the industrial market. The consumption of coke, which is the largest single item of industrial use, has already been considered and projected in the previous section on total energy demand. As for the remainder of the industrial market. there has been a downward trend since 1942. See Fig. 2 and Table 1. The general decline in the use of fossil fuels by industry has affected coal sales in this market sector, but this has been further aggravated for coal by the shifting of industry, particularly small industries, to oil and gas. The fact that prices for oil and gas will probably increase while coal prices remain constant, or increase very slowly, indicates that coal should not continue to lose customers to these competing fuels. However, since this particular market is not expected to increase in the future as explained in the discussion of energy consumption. it seems likely that coal consumption will hold at approximately the current

^{1 8}th Annual Electrical Industry Forecast, Electrical World, Vol 148, No. 10, September 2, 1957. 2 See Teitelbaum, P. D., Nuclear Energy

100 million ton level from 1960 to 1970.

The retail market for bituminous coal is another area of declining consumption. Sales have dropped steadily from 122 million tons in 1944 to 34 million tons in 1958. There is no possible room for expectation that this decline will not continue for some time to come. The popularity of the fluid fuels for small industry, commercial establishments, and residential use will persist. The lower cost of heating by coal is not sufficient to overcome the public opinion that oil or gas are the ultimate in low first cost, automatic control, cleanliness, service, and convenience. On the other hand, better equipment, marketing practices, and an improving price position may slow the decline by 1970. Therefore, retail sales are projected in a manner which indicates a decline until 1970, but a slowing of the rate.

The loss of the transportation market has been the greatest blow to the coal industry's prosperity. The 135 million-ton market of 1944, second only to general industrial use in importance, has practically disappeared. Only 4,774,000 tons were consumed for transportation in 1958. There is little likelihood that there will be a reversal of the shift of lake and ocean vessels from coal to fuel oil or the railroads from coal to diesel fuel. Conceivably the railroad market might at some time in the future return to coal through the use of the coal turbine, synthetic fuels, or electricity. However, for the period 1960 to 1970, it is best to assume that all of this market is lost and will not be regained even in part. The only condolence that can be offered the coal industry is that no further losses will have to be endured.

The final bituminous coal market to be considered is the sale of coal to the electric utilities. As previously described, electricity and gasoline will dominate the future consumption of energy. Consequently, the electric utilities are the one great hope for the coal industry to reverse its downward trend of the last 15 yr. It is accepted that a rapid growth in this market is assured. The only question is whether or not coal will share in this growth.

In the present and future generation of electric power, coal has four competitors,—hydropower, oil, natural gas, and nuclear power. In the past, hydroelectric power has been known as the cheapest of all sources of electricity. However, the percentage of electricity that has been produced by hydroelectric plants has been dropping steadily. See Fig. 3. Since most of the low cost natural sites, in favorable locations with respect to markets, have already been developed, a sudden reversal of this trend is not to be expected. Therefore, data published by *Electrical World* indicate that hydroelectric will drop from 21.8% of the total generation in 1958 to 15.6% in 1970.3

Petroleum climbed in importance as a fuel for electric utilities until 1950. Since that time it has dropped from 10.3% of the market to 6.3% in 1958. It's original growth resulted from the large quantities of low price residual fuel oil available in the United States coastal areas. Currently, petroleum import restrictions, the rising price of domestic crude, and the stability of steam coal prices indicate that the slow decline in oil's importance to the electric power industry should continue. A straight line projection of the trend of the past eight years indicates that petroleum will produce 4.0% of United States electric power in 1970.

Natural gas has made a significant inroad into the electric power market as a result of its low price per Btu for industrial purposes. This has been particularly true in the vicinity of gas fields and adjacent non-fuel producing states. However, the rapid climb in percentage of electricity generated from natural gas ended in 1954. Since that year the percentage has leveled off. It is undesirable to make a simple projection for natural gas because of this recent change in direction. In view of the recent tendency for the price of natural gas to increase, and the fact that we no longer have large quantities of excess natural gas seeking a market as was the case ten years ago, a gradual decline in the percentage of electricity from natural gas is shown in Fig. 3. This is corroborated by the fact that when the expected percentages for the other fuels are subtracted from the total electric power production a declining share for natural gas is indicated.

Nuclear power's role is difficult to assess over any lengthy period of time. However, it is quite clear that there will be little influx of nuclear power in the first half of the 1960-1970 decade. The plants which will be built in that period are under construction or on the drawing boards, and their total electric output will not be large. Furthermore, these plants will not be competitive with fossil fuels in most parts of the United States. Though the plants completed in the second five year period, 1965 to 1970, should be as a matter of course lower cost plants than the ones now proposed, it is unlikely that they will be so numerous and produce such low cost electricity that the percentage of electricity from nuclear sources will climb rapidly. Therefore, in Fig. 3, nuclear power becomes detectable in 1963 and increases to 3% by 1970.

Though there have been frequent fluctuations in coal's share of the electric utility market in the past 15 yr, the trend over that whole period has been steadily upward. The availability of coal and the probable continued improvement in its marketability on a cents-per-Btu basis should sustain this upward movement. This will mean that coal will increase from 53.5% in 1958 (a recession year) to 64.4% in 1970. These percentages are converted to tons of coal consumed with a correction for the improvement in efficiency between now and then. For example, it is estimated that steam power plants will be averaging one kilowatt hour of electricity from 0.80 lb of coal in 1970, so coal consumed for electric power generation will amount to 386 million tons in that

 $\frac{(\text{Total KWH} \times 64.4\% \times .80)}{2000}$

Total Bituminous Coal Consumption, 1959-1970

Ignoring the variations which will result from annual changes in business conditions, the average consumption of bituminous coal from 1959 to 1970 will follow the course plotted in Fig. 4. "All other" uses of coal, that is retail purchases, transportation, and general industrial use exclusive of coke, will decline slowly. The rate of decline will not be as fast at the end of the decade as at the beginning. Coke production will follow a slow, but unspectacular, trend upward. The increased demand for coking coal will compensate for the decline in "all other" uses with a little bit to spare. As a result, virtually the entire expected growth in demand for coal will stem from the expected "explosive"

³ Electrical World, September 2, 1957.

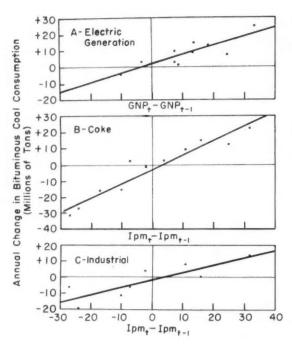


TABLE 2—Use of Total Bituminous Coal Consumption Equation For Forecasting 1958 Consumption

Data	Units	1957	1958
Total Bituminous Con-			
Sumption			
Consumers Price Index	Dimensionless	120 2	123.5
Deflated Gross National	. Dimensionies		120.0
Product	. Billions of Dollars	368.0.	358.0
Primary Metals Index	Dimensionless	131 .	104
(Equation 4)		
$B(T)_{1868} = -2.42 + 0.5$	556(GNP ₁₉₅₈ - GNI	P ₁₉₅₇) +	
	$_{1958} - 1pm_{1957}) + B('$		
$B(T)_{1958} = -2.42 + 0.5$ $131) + 415$		+1.335(1	04 -
$B(T)_{1968} = 369.64$ millio			
Actual 1958 Consumption		tons.	
Error of Consumption F	orecast = +4.74 n	nillion tons.	

FIG. 5-RELATIONSHIP between annual changes in bituminous coal consumption and economic activity.

increase in the demand for electricity. Consumption in 1959 has picked up from the depressing effect of the 1958 recession, but total recovery has been retarded by the steel strike. By 1960 coal consumption should have returned to the 1955 level, and within one or two years after that, the upward sweep toward a 631 million ton consumption level in 1970 should become apparent.

Problems of Short-Term Forecasts

In the preceding sections, it has been shown that there will be a very discernible increase in bituminous coal consumption during the next 10 yr period. However, this trend may be obscured by the year-to-year changes of bituminous coal consumption. The close relationship between bituminous coal consumption and the economic well-being of the nation is evidenced by the fact that bituminous coal consumption in the United States has always increased and decreased in rhythm with the business cycle. Since 1946, any individual expansion or contraction of coal consumption has not lasted more than two years.

Accurate short-term forecasts of coal consumption are difficult because of its relationship to the business cycle. This has been further complicated since World War II by the

shifting pattern of fuel use in certain competitive markets. Although it must be conceded that bituminous coal may still lose portions of some markets to other fuels, these losses will be negligible when compared to the expected gains in the growth markets. In particular, the downward trend of the residential and transportation markets, which have greatly affected the trend of total consumption in the past decade, cannot be expected to influence future consumption trends. In these consumption categories market losses will be small either because there is little market left to lose, or the remaining market can be considered as having stabilized. Without these depressing factors which have contributed to inaccurate forecasting procedures in the past, better short-term estimations of bituminous coal consumption should become available.

Relation of Economic Indicators To Coal Consumption

The art or science of economic forecasting has developed rapidly. Present practices vary from the simple use of past experience to the use of complex mathematical and statistical techniques requiring electronic computors. One of the most common techniques for forecasting demand is to correlate the historical record of quantities consumed of the commod-

ity in question with the time series of one or more independent variables representing measures of economic activity. In short-term forecasting these correlations seek to determine if there is a stable pattern of relationship between changes of the economic variables (in either a positive or negative direction) and the quantity to be forecast.

It is difficult to choose economic indicators which will predict accurately short-term changes in bituminous coal consumption. The real extent of the different markets for coal varies. Thus, a good indicator of the electric generation market, which is geographically extensive, would have limited application for a more concentrated market. Expansion or contraction of a national economic indicator, such as the gross national product, does not always reflect adequately relative economic changes within regions of the country or in individual coal consuming industries. On the other hand, economic indicators which are narrow in regional or industrial scope may be less precise or difficult to project. These shortcomings of the narrow-based economic indicator outweigh its advantage of having a better relationship to a particular market area or consumption category. Finally, there is the problem that no one indicator provides the necessary stable correlation pattern with all components of bituminous coal consumption. This requires the use of several measures of economic activity, but restraint is needed to avoid establishing such a multiplicity of relationships that usefulness and accuracy are diminished.

In the derivations of the following consumption equations which can be used to forecast annual changes in bituminous coal consumption, it was found that the electric generation market could be best described by changes in the gross national product, a national indicator. However, the coke and industrial categories are correlated with the Primary Metals Index, a component of the familiar Federal Reserve Board's Index of Industrial Production. Industrial consumption is defined as all bituminous coal consumed in manufacturing and mining industries exclusive of coke. The Primary Metals Index is an indicator which is far narrower in reflecting regional and industrial activity than the gross national product and illustrates some of the problems which are incurred in using a more specialized economic measurement.

Equations for Forecasting Annual Changes in Bituminous Consumption

The procedure used in deriving equations for forecasting annual changes in bituminous coal consumption consisted of determining three least square linear correlations between the individual changes in bituminous consumption in the electro generation, coke, and industrial market categories with changes in the appropriate economic indicators. The equations which evolve can be combined into a single equation which represents the total change in bituminous consumption as a function of the changes in the economic variables. The time period covered in the first two correlations is from 1948 to 1958 whereas the industrial market is based on data from 1951 to 1958.

The use of the gross national product as an indicator to forecast electric generation demand has been frequently used by others in the past, and there seems little reason to question this practice. However, it must be pointed out that the GNP has been deflated to constant dollars by the use of the Consumers Price Index (1947-49 = 100), and forecasts of annual changes

of the GNP must be corrected in a similar manner.

The electric generation consumption equation or bituminous coal, Equation 1, is as follows:

$$\begin{array}{c} {\rm B(E)_{\,t}} = 1.82 \, + \\ 0.566 ({\rm CNP_t} - {\rm GNP_{t-1}}) \, + \\ {\rm B(E)_{\,t-1}} \end{array}$$

where:

B(E) = Bituminous consumption in electric generation measured in millions of tons

GNP = Gross National Product deflated by Consumers Price Index measured in billions of dollars t = Year of forecast

The second consumption equation is derived from the relationship between coke consumption and the Primary Metals Index. Since the Primary Metals Index measures changes in the physical volume or quantity of output of primary metal manufacturing, no correction is required or inflationary changes in the value of money.

$$B(C)_t = -2.64 + (Equation 2) \\ 0.873(lpm_t - lpm_{t-1}) + B(C)_{t-1}$$

where:

B(C) = Bituminous consumption of coke measured in millions of tons

lpm = Primary Metals Index

Also using the Primary Metals Index as the independent economic variable, consumption in the industrial market category is estimated by Equation 3.

$$B(l)_t = -1.60 + (Equation 3) 0.462(lpm_t - lpm_{t-1}) + B(l)_{t-1}$$

where:

B(I) = Bituminous consumption in the industrial market category measured in millions of tons

lpm = Primary Metals Index

Graphical representations of Equation 1, 2, and 3 and the yearly data which were the basis of the least squares correlations are shown in Fig. 5. An examination of these lines illustrates the varying response of the three components of coal consumption to changes in the economy as measured by the gross national product and the Primary Metals Index. Figure 5a shows that bituminous coal consumption or electric generation is growing at a faster rate than the national economy. That is, if during a

yearly period the GNP would remain constant, electric generation consumption would still increase. On the other hand, Figs. 5b and 5c show that coke and industrial consumption would decrease as a result of a zero change in GNP. Comparing the coke and industrial markets, it is seen that the slope of the coke equation is almost twice as large as the slope of the industrial equation; thus, a large annual increase in the Primary Metals Index would forecast a much larger increase in coke consumption than for industrial usage, while a sharp contraction of economic activity would create a greater loss in coke consumption than in the industrial category. It will be remembered that during the 1950's both coke and industrial consumption were approximately at the same value, around 100,000,000 tons per year.

Combining Equations 1, 2, and 3, an expression is formulated relating total bituminous consumption with the two economic variables.

$$\begin{array}{c} B(T)_{\tau} = -2.42 + (Equation~4) \\ 0.556(GNP_{t} - GNP_{t-1}) + \\ 1.335(lpm_{t} - lpm_{t-1}) + \end{array}$$

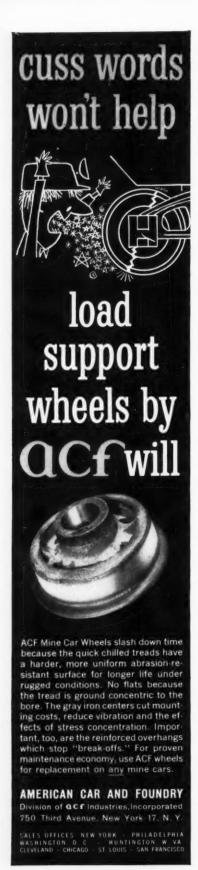
where:

B(T) = Total Bituminous Consumption in millions of tons
All other nomenclature as before.

The procedure for forecasting bituminous coal consumption is thus reduced to estimating annual changes in the two economic variables, inserting these values into Equation 4, and calculating the expected value of total bituminous consumption for the coming year. An example of the use of Equation 4 is shown in Table 2 where total consumption for 1958 is calculated using the real values of bituminous coal consumption and the economic variables for 1957 and 1958. Of course, in actual practice the forecaster would have to estimate the economic variables for the forecast year. It will be observed that the formula calculation of 1958 consumption of 369.64 million tons is just 4.74 million tons higher than the true consumption of 364.90 million tons.

Reliability of Forecast Formulas

The reliability of using the previous equations for making accurate annual forecasts of bituminous coal consumption is dependent on two main points. First, does the historical relation of change of coal consumption with change of the independent economic



variables represent a statistically reliable estimate of the future pattern of bituminous coal usage, taking into account other factors such as the increased or decreased competition of other fuels or the greater efficiency in fuel usage over a period of years? Second, can forecasts of the economic variables be made with sufficient accuracy to justify their use in the consumption equations?

Statistical tests on the reliability of the least-squares correlations show that the coefficient of correlation (r) for the three consumption equations are: for the electric generation, r = 0.96; for coke, r = 0.85; and, for industrial usage, r = 0.85. The standard error of the estimates for the three equations is approximately ± 4.75 million tons. Although a certain degree of correlation can be expected in any such time-series relationship, the statistical reliability is well within the limits of reasonableness imposed on most short-term forecasting.

The use of only a 11 year period (1948-1958) for the derivation of the equations at first appears to detract from the significance of these correlations over the long-term trend of coal consumption, but it must be remembered that changes in bituminous consumption, not bituminous coal consumption itself, is being correlated. The character of bituminous consumption has changed markedly from the pre-war and wartime consumption patterns. This change is still going on. For example, industrial consumption, which decreased during the 1948-1953 period, even allowing for changes in the level of economic activity, has shown less elasticity during the latter years of the 1950's. For this very reason the equation should be revised frequently.

Problems in Forecasting

The problem of making accurate predictions of the economic variables used in the consumption equations is the most serious job in short-term forecasting. Estimates to the annual changes in the gross national product are available from various sources, the government, trade journals, and consulting economists, or the forecaster may prepare his own forecast and compare it to the other predictions. However, the projection into the future of a lesser known indicator, such as the Primary Metals Index, requires a concerted effort by the fore-

caster to translate all pertinent econnomic information, from both short and long term trends, into a realistic prediction. For estimating the Primary Metals Index, ample statistics are published regularly by the American Iron and Steel Institute and government agencies to aid the forecaster in this respect. When it is foreseen that some abnormal element could alter the economic variable significantly during the forecast year, (such as a strike,) the forecaster may make alternative forecasts.

Summary and Conclusions

There remains much to be learned about the trends of Bituminous coal consumption from both the short and long term points of view. Modern mathematical tools of economic analysis have, as yet, been applied only infrequently to this very important fossil fuel. It has been demonstrated that for the period 1960-1970 a sharp increase in consumption of bituminous coal in electric generation is to be expected, together with a moderate expansion of consumption in other markets. It definitely appears that the 60's will be a decade in which bituminous coal will reverse the downward trend of total consumption of the previous

For the short term outlook, econometric equations, such as those presented here, are not only useful for forecasting short term consumption, but also help us to understand the relationships of bituminous consumption to the general economy. The changing pattern of fuel usage with time will require constant reevaluation of the parameters used for short term predictions. The knowledge of coal markets cannot, however, be improved beyond the limits of the basic information which is available in the form of statistics or fundamental data. Likewise, the use of the newer economic tools of analysis are limited in the same manner. The Mineral Economics Department at Penn State is presently conducting a study of the fuel consumption characteristics of energy use in Pennsylvania with particular attention to the determinants of the interchangeability of fuel use by the individual consumer and to the quantitive measurement of the size of these competitive markets. The results will be available in the near future.

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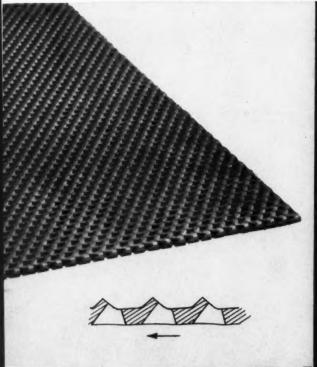


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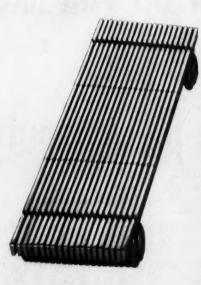


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Another customer needed an S-D Brakeman Personnel and Supply Train. In his case, however, underground haulageway required low-height train. The two S-D Man Cars are uncoupled from S-D Brakeman at bottom of slope and coupled to conventional locomotive which transports men to working areas. You will note neither design has costly streamlined construction. They are compact all-steel functional units with each steel member an integral part of the frame work. Result: Minimum manufacturing cost which means you pay less! Safety at low cost has been the important factor!

Below is another type S-D Brakeman fre-quently ordered to replace locomotive used in trips for braking.

Pictured below is an S-D Brakeman Personnel and Supply Train designed and built to operate on 17 degree slope by hoist-cable. Note S-D Brakeman was built with material-handling platform to be level when transporting supplies on the sloping haulageway. At a pre-determined setting the revolution of the wheel applies the brake shoes.

To: Sanford-Day, 612 Dale Avenue, Knoxville, Tenn.

Gentlemen, please send by return mail CAR BULLETIN A400 with specifications, data and fully illustrating S-D Brakeman Cars

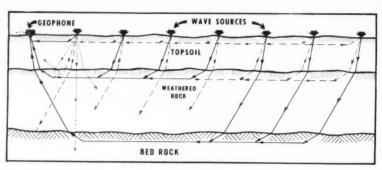
ADDRESS

CITY STATE

KNOXVILLE, TENNESSEE



TODAY'S strip operators are paying closer attention to overburden preparation procedures to get maximum fragmentation at the lowest possible cost.



SEISMIC ANALYSIS of overburden enables operators to determine quickly, easily and economically the best method of handling overburden.

Breaking Overburden At Today's Strip Mines

Today's strip operators are paying more attention to drilling methods and hole patterns as well as becoming more proficient in using breaking mediums. Here's a roundup of the tools they are using and the results they are getting.

OVERBURDEN PREPARATION is fast approaching a science—and there are bright prospects for even more sophisticated drilling and blasting methods in the future. Here's why. Strip operators realize that despite the great savings resulting from make-your-own blasting agents and modern drills there are still unexplored avenues leading to lower costs.

While taking a long hard look at today's methods, operators already are trying or studying completely new drill designs and refined makeyour-own blasting agents. These new developments could be as revolutionary as the original vertical rotary dry-type overburden drill (Coal Age, March, 1953, p 80) and the announcement of Akremite makeyour-own blasting agent (Coal Age, May, 1955, p 70).

A quick, easy and inexpensive method of determining the consolidation of overburden now is available. By employing this method, called seismic analysis, strip operators can determine if overburden can be bull-dozed and scraper loaded, ripped and scraper loaded, or if it must be drilled and blasted for handling by a shovel or dragline.

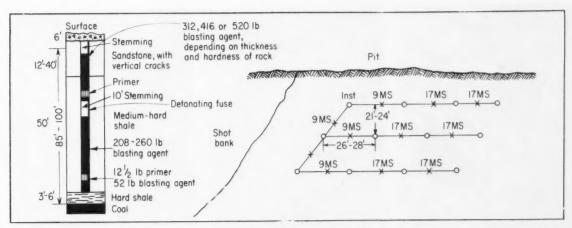
Studies of the relative costs of ripping and drilling and shooting showed that the cost of loosening rippable material ranges from less than 12% to 60% of the cost of drilling and shooting. The seismic method makes it possible to determine rippability quickly.

The seismic method involves use of a refraction seismograph which measures the overall consolidation of subsurface materials, including rock hardness, stratification, fracturing and the degree of weathering. It also is possible to determine the thickness of various layers of subsurface materials to depth of 100 ft (Coal Age, December, 1959, p 102).

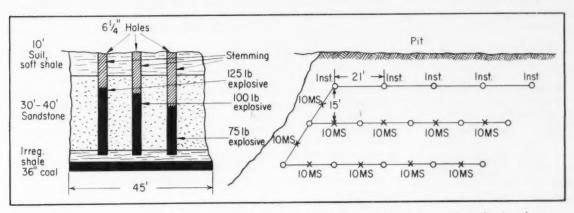
Vertical Drilling

Rotary dry-type units lead in drilling vertical holes although improved vertical augers are still proving themselves valuable. For example, one vertical auger sinks 9-in holes to a depth of 100 ft in course-grained sandstone. A wide assortment of rotary dry-type machines is available to meet the needs of both large and small mines. Some of these machines are mounted on crawlers, others are carried on truck frames. Hole diameter varies from 5½ to 12 in.

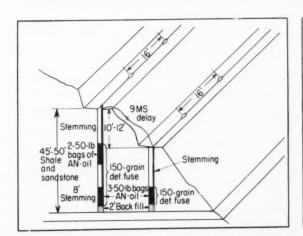
Most operators in thick cover and producing large tonnages favor the big crawler-mounted rotary machines capable of drilling up to 12-in holes. These large-diameter holes make it



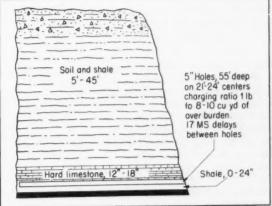
DECK LOADING concentrates part of the charge in the upper portion of thick overburden for better fragmentation.



MULTIPLE ROWS of vertical holes with varying charges are effective in breaking bank composed mainly of sandstone.



TWO-LEVEL DRILLING is a common practice in hillside stripping. Deeper holes receive heavier charge.



HORIZONTAL HOLES make it possible to concentrate explosives near hard layers near the top of the coal.

possible to concentrate explosives in the hard layers and to use less-dense low-grade explosives, such as, the make-your-own mixes. They also make it possible to break a larger volume of the overburden with fewer blastholes.

Some typical results with big vertical rotary dry-type machines are as follows:

1. An average of 1,100 ft of 9-in

hole in 8 hr while drilling in 50 ft of medium-hard shale covered by 12 to 40 ft of sandstone. Bit life averages 21,000 ft of hole (*Coal Age*, January, 1959, p 59). (*Continued*)



DRY HOLES receive oil-treated ammonium nitrate prills directly from bags.



DAMP HOLES are loaded with nitrateoil mixture packed in polyethylene bags.



WET HOLES are loaded with explosive packaged in water-resistant cartridges.

Hole-charging methods vary to meet changing conditions

2. An average of 625 ft of 10%-in hole per shift in hard, sandy shale that ranges from 45 to 70 ft thick. Bit life is 13,704 ft (*Coal Age*, July, 1959, p 108).

3. Up to 700 ft of 9-in hole per shift in shale or shale mixed with sandstone in 40 to 50 ft of cover (*Coal Age*, March, 1960, p 70).

4. An average of 1,200 ft of 6¼-in hole in one shift, using a machine with a 55-ft mast in overburden that includes 30 to 40 ft of sandstone. Bit life is 4,000 to 6,000 ft (*Coal Age*, February, 1957, p 98).

In 75 to 100 ft of overburden made up of hard shales and sandstone, an improved-design crawler-mounted unit operated by a two-man crew, drills 400 to 900 ft of 9-in hole in 8 hr. It is able to do in 16 hr a day and one day less per week the work formerly requiring round-the-clock operation 7 days a week (Coal Age, July, 1958, p 92).

Vertical augers are added starters in the drilling lineup and now are capable of drilling a 9-in hole in coarsegrained sandstone to a depth of 100 ft. At one operation an auger-type machine drills an average of 600 ft of hole per shift (*Coal Age*, July, 1957, p 60).

When drilling through clay or soil with a rotary machine, some companies have experienced difficulty with the hole squeezing together. They have solved this problem by augering through the soft material and then changing to the regular oilwell-type bit. Although this method requires two extra tool changes, the faster penetration of the soft material and elimination of squeezing more than offsets the disadvantages. One Illinois operator saved \$8,000 per year in bit cost with this method.

Where flexibility is extremely important and operations are in the medium or small-size range, there are many smaller, lighter and less expensive vertical rotary machines available. To day's designs include both truck and crawler-mounted units, usually equipped to drill 4%- to 6%-in holes.

One of these special units is mounted on a wide-gage tractor, has a built-in water system for wetting the fine dust generated by the drill and a 28-ft mast that can be raised or lowered in less than 2 min. Two men drill an average of 600 ft of 7%-in hole per shift and have drilled as much as 100 ft per hour in addition to loading explosives. Bit life averages 4,000 ft of hole (Coal Age, June, 1957, p 60).

Tomorrow's Vertical Drill

A bright prospect for the immediate future in vertical drilling is a unit that does all of the things that today's big rotary machines do and then adds

more maneuverability and flexibility in placing holes. One such unit already is undergoing field tests now.

Design features are said to include a shovel-type revolving frame that makes it possible for blastholes to be sunk at any point around the machine. Another feature makes it possible for the drill's mast to be tilted so that holes can be sunk parallel to the face of the highwall.

By drilling the angled holes, the company expects to get better distribution of explosives, which will result in better fragmentation of the rock. If drilling and shooting result come up to expectations, there also is the possibility of concentrating more explosives in the holes and blowing a large portion of the overburden into the pit. By thus decreasing the load on the stripping machine, effective stripping capacity would be increased.

The new vertical experimental machine could spawn future advances in drill design. For instance, a second drill might be added to the turntable and both units controlled from a central station. A further refinement of a two-drill machine would be adjustable centers so that distance between holes could be varied.

Sidewall Drilling

There are still operations where sidewall drilling is the preferred method. Drill manufacturers also are continuing the search for improvements to boost machine capacity and simplify operation. Most of the units in service today are either truck mounted or are towed on small trailers. But some special designs have been developed with facilities for adjusting drilling height several feet or for inclining holes upward.

Drilling capacity to keep up with a 40-yd shovel moving 1,195,000 cu yd per month and one-man operation are features of a horizontal rotary drytype drill. Working one full and one part shift six days a week, it drills enough holes for uninterrupted, round-the-clock shovel operation. A single drill stem, 60 ft long and hydraulically fed 9 ft at a time, makes it possible for a 9-in hole to be drilled 48 ft deep without adding drill sections. In the best single shift 816 ft of hole was drilled (*Coal Age*, October, 1957, p 98).

Further improvements in sidewall drilling is a possibility for the near future. For example, a two-headed horizontal dry-type machine is said to be under development.

If the twin horizontal unit should prove successful several refinements in design could be added. For example, distance between drill heads could be made adjustable; a tilting device might be added so holes could be drilled at an angle; and drilling height might be made adjustable.

Special Drill

Where a major portion of the overburden is soft enough to be dug without previous shooting there often is the need for special units to drill a thin layer of rock over the coal, or to drill a hard rock band between two or more coal beds. A three-man crew at a western Kentucky mine uses a four-unit jumbo on a tractor to sink 2-in holes on 6-ft centers in a 4-ft layer of limestone. In average work, four holes are drilled in 4 min (Coal Age, October, 1956, p 65).

Other machines available for drilling thin layers include single air-powered drills on hand-pulled wagons and one or two drills on the rear of a tractor.

Breaking Rock Today

Today's strip operators are acutely aware of the value of flexibility in charging and blasting techniques. As a result they are constantly studying the overburden to make changes in methods to get the most from explosives.

Since each mine is a distinct problem, no hard and fast rules can be laid down.

Ammorium nitrate-oil mixes continue to lead as a breaking medium for overburden. Despite the low cost of the mixture, operators are stressing more and more the need for better mixing and packaging, along with better handling in the pit.

Not only are operators becoming more interested in better mixing and handling, they also are becoming more particular in the quality of the nitrate they are buying. For example, such properties as grain size, porosity, particle strength and moisture content are being studied more closely. And research is under way to develop better mixtures of oil and nitrate.

Results of some tests show that when using straight prills, best results have been obtained with a coated product. For example, detonation velocity increases as much as 10% when 2 to 3% of coating agent is mixed with uncoated nitrate before adding the fuel oil. By coating with an oil-absorbing material, mixing is easier and oil is held in closer contact with the ammonium nitrate.

Uncoated nitrate-oil mixtures are more sensitive to detonation but are not as efficient as coated mixtures. Sensitivity and detonation velocity vary with the oil content. Maximum sensitivity is attained with 2% oil and maximum detonation velocity with 5 to 6%.

Grinding all or part of the nitrate before mixing with fuel oil increases detonation velocity by as much as 1,000 fps. But the cost of handling and grinding the nitrate could be greater than the advantage gained with the faster product.

Velocity of detonation of nitrate-oil mixes increases directly with loading density. Loose, poured mixtures have a density of about 0.75; well-tamped and stemmed mixes have a density of over 0.9. The denser mix has a 20% faster detonation velocity.

Multiple primers increase the apparent velocity of detonation. By starting the chemical reaction at several points the time required for a charged hole to detonate is reduced. An added feature of multiple detonation is the greater chance for setting off the charge.

Most companies making their own blasting agent use either prilled or grained ammonium nitrate with No. 2

fuel oil. Approximately 3 qt of oil are added to each 100 lb of ammonium nitrate. Many of the larger companies have their own mixing plants where ingredients can be metered as they flow to a mechanical mixer. Some companies use the product immediately after it is packaged while others prefer to let the mixture season before using it. The seasoning period varies from several hours to several days.

Other producers prefer to mix the nitrate and oil at the hole site. Oil is poured over opened bags at each hole and then left to percolate down through the ammonium nitrate for a short period before holes are charged.

There is a trend toward using grained ammonium nitrate because it provides a blasting agent with 20% to 30% greater density. As a result more blasting agent can be concentrated in drillholes.

Some operators are using a combination of grained nitrate-oil for loading the bottom of holes and prilled nitrate-oil for the upper portion. This method of loading concentrates the blasting agent where it is needed most and makes possible wider hole spacing. There is a corresponding saving in drilling requirements.

Non-nitroglycerine primers for use with make-your-own blasting agents are growing in favor. These primers are popular because they cannot be detonated if a shovel digs into a misfire. Danger to personnel and equipment from this hazard thus is eliminated.

Mechanical Handling

Mechanical charging devices are making possible two-fold savings in charging both vertical and horizontal holes. For instance, experiments at an Ohio mine showed that an 80-lb bag of ammonium nitrate could be mixed with 1 gal of fuel oil and then blown into a horizontal hole in 10 sec (Coal Age, November, 1958, p 86).

A West Virginia operator buys 80-lb bags of a pre-oiled 50-50 mixture of nitrate prills and granules and blows it into horizontal holes with a truck-mounted unit. It takes about 3 min to blow 240 lb of nitrate-oil mix into a hole. Each hole is primed full length with 1½x12-in high-velocity gelatin inserted in connected sections of tubes.

Another company solved the nitrate-handling problem by developing an air-loading procedure for charging holes angled upward at 45 deg. Nitrate is poured into the unit's storage hopper and then fed to an air tank. As air at 35 psi moves the aitrate through a rubber hose fuel oil is forced through a second hose. The two ingredients meet at a junction and flow through a pipe into the drillhole at the rate of 100 lb in 100 sec (Coal Age, November, 1958, p 105).

The load-tamp machine also saves time and effort in loading and tamping horizontal holes. With this machine, one man in four days, single shift, does the work that two men formerly did in five and six days with hand methods. The operator places the explosives and tamping bags in the collar of the hole and then uses the machine to push them back in the hole. Using prefilled tamping bags one man has loaded and tamped a maximum of 28 holes in a shift (Coal Age, September, 1957, p 88).

Bulk handling procedures are cutting the costs of loading vertical holes at a number of operations. One truckmounted bulk loader includes a removable storage hopper, hoist, air compressor, oil tank and a measuring dispenser. Ammonium nitrate flows by gravity from the raised hopper and then is sprayed with oil as it drops through a drain pipe into the hole. A hole can be loaded with 200 to 300 lb of mixture in 20 sec.

There are some advantages of using premixed and packaged ammonium nitrate blasting agents which are based largely on the dynamite types of grained ammonium nitrate. For example, the finer dynamite grades of nitrate generally give higher loading densities and higher detonation velocities than prills. And they can be formulated to give a high degree of water resistance. These products are packaged as cartridges in fiber drums, or in polyethylene and burlap laminate bags.

Many of the explosives manufacturers are marketing ammonium nitrate-type blasting agents. Some of these are as follows:

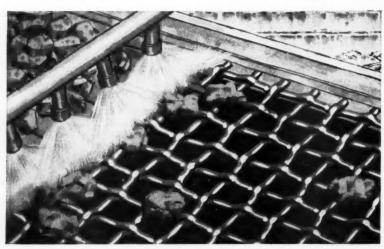
- 1. Nitrocarbonitrate which contains technical-grade ammonium nitrate instead of commercial grade. It is not cap sensitive and therefore a primer must be used for detonation. Speed is about 11,500 fps.
 - 2. Unimite.
- 3. Methanite which contains technical-grade ammonium nitrate, coal dust and nitromethane. The nitromethane acts as a sensitizer for the ammonium nitrate and under certain conditions it is not necessary to use a primer. Speed is about 13,000 fps.

Improvements in manufacturing techniques have resulted in lower prices for liquid-oxygen explosives. Having a speed of 17,000 fps, this product has been useful in breaking high banks containing massive sand-stone.

Drilling and Loading

Vertical drilling patterns, by and large, have not changed greatly in recent years although there has been a trend to increased spacing between holes with the advent of the larger-diameter drillholes. When more than one row is drilled a staggered pattern is favored.

There are a number of advantages in shooting against a buffer where vertical drilling is practiced. For instance, large unwieldy pieces of rock that are sometimes produced when shooting against an open face are eliminated. The long toe at the foot of the highwall is eliminated. Further-



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Super-Tempered is a selected high carbon, oil tempered steel, specially heat treated for abrasion-resistant toughness. Wisscoloy is a special alloy, hard and tough, yet economical for low screening cost.

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more, the drill is not required to work near the edge of the highwall. And a uniform drilling pattern can be maintained once a pit is opened and adjustments made for irregularities.

A western Kentucky operation employs deck loading in 9-in holes spaced 26 to 28 ft apart in three rows on 21- to 24-ft centers. Delays of 9 MS are used between rows and 17 MS between holes. Overburden, made up of medium-hard shale and sandstone, ranges from 85 to 100 ft thick. Charging ratio averages 1 lb of nitrate-type blasting agent to 3 cu yd of overburden and up to 25% of the material is moved by the explosive alone (Coal Age, January, 1959, p 82).

In two-seam contour stripping in West Virginia, two rows of vertical holes are drilled 27 ft deep on 15-ft centers. Water and loose material are blown out with compressed air before holes are charged. Horizontal drilling also is practiced in some areas. Cartridges of ammonium nitrate-type blasting agent with built-in primer simplify loading of horizontal holes (Coal Age. April, 1959, p 84).

A 30-yd-shovel operation in Missouri employs horizontal drilling to a depth of 55 ft to concentrate explosives under a hard layer of limestone near the coal. Holes, on 21- to 24-ft centers, are charged with ammoniumnitrate cartridges with built-in primers. Charging ratio is 1 lb to 8 to 10 cu vd of overburden (Coal Age, May, 1959, p 80).

Multiple-deck loading is practiced at an Ohio property to get maximum fragmentation with a minimum of explosives. Management's goal is 31/2 cu yd of overburden per pound of explosive. Two-deck loading is practiced if overburden is 47 to 70 ft; three-deck loading is used in 70 to 100 ft of cover; and four-deck loading is carried out if overburden is more than 100 ft thick. Delays of 17 MS are used between holes and 9 MS between rows (Coal Age, July, 1959, p 108).

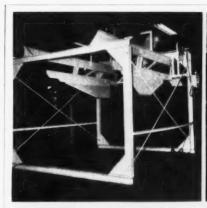
At a dragline operation in Ohio, a bulldozer scalps off 3 to 30 ft of loose material before two rows of 8-in vertical holes are sunk on two levels in sandstone. Proper charging ratios for different drilling patterns and hole depth are maintained with the aid of a blasting chart (Coal Age, January, 1960, p 82).

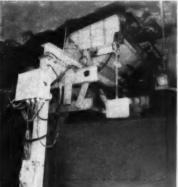
A crawler-mounted rotary dry-type machine sinks 9-in holes on 16-ft centers around the hillside at an Alabama operation. Each hole is primed with 6 to 8 ft of 150-grain detonating fuse and all holes are laced with the 50grain type. Deck loading is practiced when holes are 45 to 50 ft deep. Charging ratio is 1 lb to 2 or 3 cu yd of overburden (Coal Age, March, 1960, p 70).

Engineered drilling and shooting service could enter the overburden preparation picture. Such a service might include one or more of the following: (1) seismic analysis of the overburden to determine the most economical method of removing the material; (2) planning of drilling and

charging patterns; and (3) loading holes and shooting the overburden.

Custom mixing of ammonium nitrate-oil to get the best possible product for each pit might be included in this service. A number of mines could be served from a central bulk storage station by highly efficient bulk loading or blow-charging units. Such a service might be particularly attractive to small or medium-size operators who want the best in bank preparation yet are not large enough to set up and operate their own plants.





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"Our ten Ford Tandems are nearly a year old and not one has been off the job for repairs"

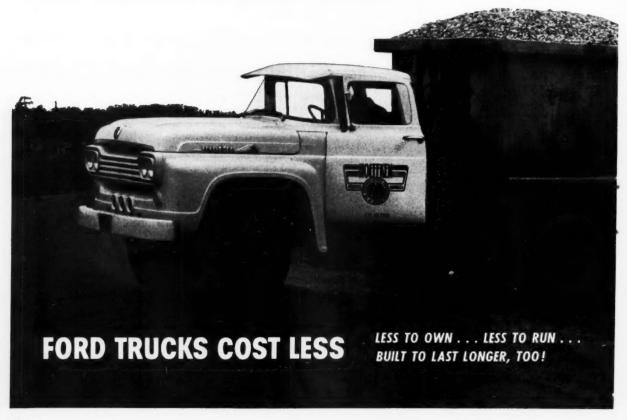


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Totally new for total savings! Ford's new Falcon Ranchero delivers up to 30 miles on a gallon, yet its new 90-hp Six is geared to do a real job! There's lower costs for oil, tires, brakes, replacement parts . . . nearly everything!

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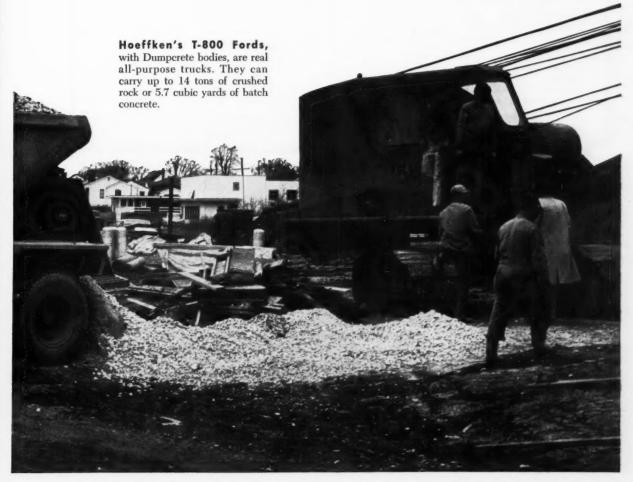
Capacity is more than ample for most pickup hauls—nearly 8 feet of load length with tailgate flat. And thanks to the low floor height, loading and unloading is faster, easier!

FEATURES:

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- 2. 4,000 miles between oil changes
- 3. Diamond Lustre Finish needs no waxing
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- 7. Styled to capture admiration

*Based on a comparison of latest available manufacturers' suggested retail

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Maintenance Ideas

				ine Supt. ffice Copy ection Fores	mon Copy	COPIES *: 1 - Repair Shop 2 - Mine Supt. 3 - Originator's File
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	5	SECTION FOREMAN	l:			REPAIRS REQUESTED BY: Signature:
-			Date:			Date:

MAINTENANCE ACTION is initiated by section foreman requesting needed services or repairs.

Preventive Maintenance: Records Make the Difference

R. W. Greer Coal Machinery Div. Joy Mfg. Co.

RETURNS ON EQUIPMENT IN-VESTMENTS materialize much faster for companies that recognize the need for good maintenance and initiate a modern maintenance program. A report and record system is a prerequisite for a follow-through approach to maintenance practices and procedures. Regardless of how efficient a high-capacity machine may be when operating, the advantages are lost if its downtime rate is high.

Excessive downtime and resultant loss of tonnage reflect the lack of an effective maintenance program. Consequently, much study is devoted today to the development of maintenance procedures designed to keep equipment in operating condition. Two terms identify this work as "preventive maintenance" and "production maintenance."

If the definition of maintenance is

accepted as keeping in condition, especially a state of efficiency, the adjectives "preventive" and "production" are superfluous. However, there is a great deal of difference between an organized effective program that keeps equipment in working condition and one that simply calls for repair of machinery when it breaks down.

Records Make the Difference

A system of well-planned record forms and consistent use of these

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EMERGENCY CALLS are recorded and then assigned to a repairman who takes necessary action.

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MAINTENANCE SUMMARIES enable supervisors to analyze and formulate maintenance activities.

forms will provide the facts around which an effective maintenance program can be developed. These forms will show breakdowns for each machine, and why repair-time allocations for the period, repairs effected, general condition of each machine through periodic inspections, general maintenance for the period covered and summations of the preceding items provide a workable maintenance history.

Learning the facts is all-important if management intends to minimize downtime. An effort should be made to determine the exact cause of a breakdown. In short, study "cause" as well as "effect."

A record should be kept to show which parts or operating factors are responsible for recurring breakdowns; how much equipment downtime is directly attributable to machine failure; and how much is caused by other factors such as human error, power failure, poor repair work and poor or unavailable replacement materials and tools.

The company which does not have this information cannot provide adequate maintenance.

A planned maintenance program using such records provides savings by eliminating confusion and waste in repair work. For instance, an unorganized operation may permit a repair request to be relayed verbally. Under a planned program every operation is recorded on paper to bring the matter to the attention of authorized personnel. This recorded information will halt wasted effort by

preventing work that is unnecessary or improper, or duplicates a job already done or one that is scheduled at a time which will delay production unnecessarily.

Records kept in connection with an effective maintenance program will provide the company with a sound basis for planning. They will help develop a number of valuable guides to keep the program improving and progressing. For instance, with such records the company will be able to:

- 1. Compare performance of all equipment.
- 2. Establish standard times for completing various maintenance jobs.
- 3. Enable supervisors to schedule jobs efficiently and to maintain a working force of the proper number.

Maintenance Ideas

POPM	M 1006A			Date
	15-DAY PRODUCTION MAINTEN			
	(This report is to be returned at the o			
	Check only ofter Item is inspected or			
	JOY L	OA	DF	DER
		()		the same production of the same of the sam
)				Clutch Settings: rated amperage
()	Controls: Speechand assessed assessed assessed to			Pivot Pins & Hinge Points All leads, glands & junction points
	*			All leads, glands & junction points Cable
	JOY SHUT	TTI	LE	CARS
)	1st Car (Left Hand)			(-) 2nd Car (Right Hand)
	(-) Motors & brushes, fields, commutator, wiring.			() (-) Reducers: oil level adjustments.
)	(-) Control Panel: main contact tips, fuses, merce	ury		() (-) Clutch Setting: adjustments.
	tubes, wiring. (-) Controls: fingerboard, contacts, segments, wir	***		() (-) Boom: pivot points sideboards
	(-) Conmois: rangerocord, commocre, regiments, and	ing.	*	() (-) Steering adjustments, if needed. () (-) Cable
) (JOY CUTTING MACHINES Meters, brushes, fields, commutators, wiring,
)	Central Panel: main control tips, fuses, mercury tube
1 /	Armsture Bearings			wiring resistors.
) (Contactor: fingers, drums, wiring, blowout cail, arc			Controls: fingerboard contacts, segments, wiring.
-				Reducers: ail level, adjustment, Cables
	CAR HOIST			JOY DRILLS
	Motor: brushes, fields, commutator, and wiring.	-	-) Motor: brushes, fields, commutator.
) ,	Resister.) Hydraulic pressure and amperage setting.) Mechanical body.
totes				
9100				
	Needed		******	
ela) ese				
		diller.	****	ACTION OF THE PROPERTY OF THE

FIFTEEN-DAY INSPECTIONS detect trouble before breakdowns occur.

- 4. Analyze costs through recorded data.
- 5. Develop schedules for the most economical program of overhaul and replacement of equipment.
- Give direction toward increased efficiency and consequent lower production costs.

Record System

Record-keeping and especially record-using are the most important factors in developing a successful maintenance program.

There are seven types of records which provide the nucleus of a maintenance-record unit:

Service or Repairs Requested—This form is used to initiate maintenance action. It is designed primarily for section foremen. Foremen are required to list equipment that needs service, the nature of the disability, situation under which the trouble oc-

curred and other necessary information. Because it is the responsibility of section foremen to initiate this action, the form illustrated in this feature is shown attached to a standard daily section report. The service or repairs requested form could be made available to equipment operators, repairmen, maintenance and safety inspectors.

The form, when completed, is sent to the maintenance department. It is then checked by the maintenance supervisor or other authorized persons. The checker has the authority to OK the request, specify necessary action and assign a repairman to handle the job. He also has the authority to schedule the work on a priority basis or he can delay making a decision until either he or a member of his staff examines the situation personally.

No matter what kind of routine or unusual action may be taken, a copy of the repairs-requested form must be in the hands of the maintenance repairman before he carries out the assignment. If he cannot handle the job he returns the form for reassignment. If equipment must be sent to the repair shop the maintenance supervisor keeps the form. He is responsible for expediting the work through the repair shop.

Daily Record of Repairing-This form is used in case of emergency or when requests are received by telephone. A record is kept in the maintenance office. The person receiving the call records information such as section number, time of call and trouble (see report form). The repairman handling the call then records "time out," carries out his assigned job and lists on his return to the office a complete record of his operation including time consumed, parts repaired, replacement parts used and his final OK and the OK of the section foreman who made the original request for repairs. In case the repairman cannot complete the job he lists uncompleted work on the service or repairs requested form. The form is kept on permanent file and is used by the repair foreman in making his weekly report.

Maintenance Foreman's Weekly Report—This report summarizes information concerning major and expensive repairs handled by a maintenance unit. It enables the supervisor to keep track of all major jobs and provides quick access to data to analyze factors of time, costs, type of repairs, etc. It also formulates his thinking in classifying relative importance of various jobs.

Five- and Fifteen-Day Production Maintenance Reports-These basic inspection reports permit detection of trouble prior to breakdowns. They are issued regularly by the maintenance supervisor and must be returned promptly by repairmen conducting maintenance on idle shifts. The items listed (see report form) are intended to cover most areas of possible equipment trouble. The inspector must indicate that action has been taken on all items, either listing his OK or noting that he has initiated corrective action. The maintenance supervisor, after receiving the form at the end of the inspection period, conducts frequent follow-up checks to determine the quality of the ac-

The work on the 5- and 15-day re-

ports can be done any time during the designated period, except on items which need daily attention.

Each equipment item is listed on the report so that it will be checked at the proper time interval. The 5and 15-day periods are suggested for routine operations. The maintenance supervisor may choose time periods more suitable.

Equipment Records—This is a permanent record for equipment. It carries a complete maintenance history of the machine, listing all major repair jobs, parts and labor required and other factors. Analysis of this information over extended periods of time permits discovery of pertinent facts such as the types of failures which tend to recur and the rate at which the machine's overall maintenance cost is rising or falling, monthly or yearly.

It also serves as a yardstick to determine when overhauls and replacements should be made. Overhaul enables the company to maintain the high production potential of its existing machinery without suffering from diminishing returns. Replacement enables the company to obtain machinery of newer design.

Basically the equipment-record form is used for complete units such as miners or loaders. It also can be used for principal subassemblies.

Summary of Delays—When the section foreman completes his daily operating report he indicates all delays and downtime, specifying the amount of time lost and the exact reason for the delay. The maintenance super-

	Date
5-DAY PRODUCTION MAINTENAN	CE REPORT Mine
(This report is to be returned to Shop	at end of Section
5-day check showing items inspected	or repaired)
JOY LO	ADER
() () () () Lubricate	() Arm Bearing Adjustments
() () () () () Conveyor Chain: flights, rivel	ts, keys, () Conveyor Assembly: foot shoft, idlar rolls
straps, nuts, and adjustment.	guides, and swing ropes.
() () () () Drive Chain, wear, adjustment guards, and ail.	 keys, () Hydraulic System: hoses, fittings, jacks, jack-pins and leaks.
() () () () Speed reducer oil level.	() Physical body—bumper, guards, contactor cover, external colles, etc
JOY SHUTT	LE CARS
) 1st Car (Left Hand)	-) 2nd Car (Right Hand)
)()()()() Lubricate.) (-) Conveyor: flights, chain, keys, straps.
-, (-, (-, (-, (-, (-, (-, (-, (-, (-, ((-) Specing devices: specis, thread bar, and sheave (-) Conveyor Clutch-mechanical linkage.
) (-) Headlights.
) (-) Hydraulic System: hases, fittings, and leaks.
bolts, and tire pressure (visual)) (-) Brokes: fluid and fining.
-) (-) (-) (-) () Wheel units, lug bolts, Universal (bolts, and tire pressure (visual).) (-) Physical Body: reel box, guards, sheave bracket bolt, external cables, etc.
JOY CUTTING MACHINE	JOY T-2 TRUCKS
) () () () Lubricate ()	() () () Oil level: speed reducers.
) Cutter Bar, cutter bar chain, and dead lugs. ()	() () () Drive Chains: wear, adjustment,
) Controller; fingers, arc-divider reverse.	keys, guards, and ail.
) Guards and rope on cylinders. ()	() () () Spooling Devices: spool, threadbo
	and guards.
CAR HOIST	and guards.
CAR HOIST	JOY DRILLS
() Lubricate.	JOY DRILLS
) Lubricate.) Clutch and gears.	JOY DRILLS
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) Lubricote. Clutch and gears. Guards and rope. JOY CONTINU () () () () Lubrication (daily) () () () () Water system sprays, hoses, valve, stc. (daily) () () () () () () Timber Jacks. () () () () () Conveyor chains, pins, locks, streps etc. (daily)	and guards. JOY DRILLS () Lubricate . () Hoses - fittings, and leaks. OUS MINER () Gear cases. () Hydraulic hoses. () Head light - Bulb, wiring, etc. () Choseis & trunteble. () Choseis & trunteble. () Hopper () Dust guards. () Ripper chain - adjustment.
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() Lubricate. () Clutch and gears. () Guards and rope. JOY CONTINU) () () () Lubrication (daily)) () () () Water system sprays, hoses, valve, stc. (daily).) () () () () Timber Jacks.) () () () () Conveyor chains, pins, locks, streps atc. (daily)	and guards. JOY DRILLS () Lubricate . () Hoses - fittings, and leaks. OUS MINER
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FIVE-DAY INSPECTIONS are conducted on more vital components.

			EQUIPMEN	T RECORD	Type Model Company No.		•
Location		Date	Location Do			Location	Date
Date	Repairs	, Replacement, or T	•st	Remarks (cau	use of failure, to	est, etc.)	Initial
							-

ANALYSIS OF PERMANENT RECORDS permits discovery of pertinent facts relating to equipment.

SUMMARY OF DELAYS is used to analyze downtime characteristics.

visor has this information recorded on a summary of delays form to analyze equipment performance. Records are maintained by the accounting department or a maintenance clerk.

Downtime periods are recorded on the summary as a frequency and percentage of total working time available. Each delay is listed as a percentage of the total. Delays also are subtotaled into three general areas of failure—electrical, mechanical and human. The records of various operating sections are compared with others to detect significant differences.

The maintenance supervisor uses this summary to analyze downtime characteristics, total cost and reasons for delays. This provides a basis for initiating the proper steps to decrease downtime.

The Follow-Up

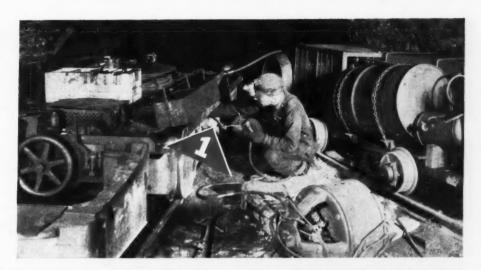
Maintenance records, among other things, provide necessary information to gain insight into the nature of operating problems. A maintenance organization must take full advantage of the record system if it is to improve the over-all maintenance program. In almost every case it is likely that the newly-developed maintenance program cannot be implemented fully with the resources which the company currently commands. It must institute additional changes in other operations to insure success.

Necessary tools to repair and maintain equipment must be provided even though the initial cost seems high. This cost will be quickly amortized when equipment that might have been out of production for days at a time is producing at full capacity.

The company also should provide well-lighted work areas and sufficient room in which to work carefully. Underground shops should be installed to handle all repair jobs, store materials and to give rapid service. Surface shops should provide supplemental services to underground shops.

The maintenance force should be equipped with modern transportation and communication devices, such as mobile repair units and radiophones.

The company also should make itself more aware of maintenance services offered by the original equipment manufacturers. Today, mining machinery manufacturers offer main-







ESSO LUBES CUT COSTLY EQUIPMENT WEAR

1. NAKTA® Lubricants stay put in mine car wheel bearings even under the wettest conditions. Proved over many years and millions of miles of mine car wheel service.

2. NEBULA® EP multi-purpose grease is highly versatile... provides extreme-pressure and anti-wear qualities. Available in grades for both bearings and gears. Exceptionally resistant to water, oxidation, or thinning by heat. Reduces number of greases needed with their attendant costs of handling, storage and equipment investment.

3. AROX® EPLubricants lower corrosion and wear in air powered equipment... 4 ways. (1) Guard against pounding wear with extreme-pressure agents; (2) Stick tightly to metal surfaces to ward off rust; (3) Minimize acid corrosion; (4) Atomize as desired in cold weather.

For further information on these and other special lubricants, contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.



In Industry after Industry..."ESSO RESEARCH works wonders with oil"

tenance and repair services, complete rebuilding, replacement programs and a great deal of valuable information and advice.

Maintenance is a full-time operation and should be provided for on this basis. Sufficient numbers of maintenance men must be made members of each operating section. Plans should be made for upgrading job requirements—upgrading will need to increase in the future, even more rapidly than now. Training methods and programs should be established for maintenance and supervisory forces.

The company could provide spare machines and change out an entire machine on a regularly scheduled basis. It may be desirable to provide spare operating sections to permit scheduled shutdown of regular sections. There should be a specially-equipped maintenance crew to work on the regular section during these shutdowns. Two production shifts

with the third reserved for maintenance should be practiced whenever possible.

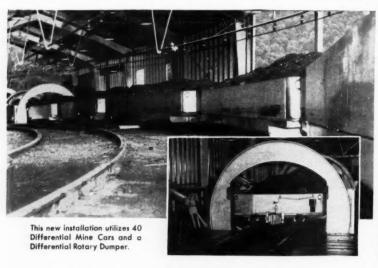
It is important to replace machines before they fall apart rather than afterwards. Much of today's new equipment is replaced only because the old equipment is unusable or because economics have forced the company into using machinery with higher capacity. New depreciation figures show that beyond a certain point a machine's operating costs are greater than the profit realized from its production. These new figures can be proven or disproven by the information gathered from maintenance records.

The use of records and actual follow-up in the development of a maintenance program demands the cooperation of all employees. Employees can be sold on a maintenance program. This includes men in echelons above as well as below those who developed the program. A maintenance operation is nothing but words without a spirited, vigorous organization backing it. An effective communications program can help each supervisor sell the program to his subordinates by explaining it thoroughly and stressing the way in which it points toward improvement.

Production and maintenance are interdependent. Both the production worker and the maintenance man should be sold on the idea that the production worker is only effective when his machine is operating.

Employee objections that they are being watched too closely, or that the system is intended to expose their weaknesses can be answered effectively by a good communications program. Complaints about "too much paper work," "extra busy work," etc., must be met head-on by a program of education which will explain the need and convince workers that such effort makes a contribution.

Maintenance is as old as the wheel. But there are new ways of going about it that mean more profit. The program described in this feature is an evolutionary program that will take time to develop. Nevertheless, evolution is necessary. Events have made it so. There can be no return to many of the halfway measures of oldtime maintenance. Dependence of successful maintenance operations will continue to increase. Companies lacking in modern methods will lose more heavily.



haulage capacity...

Place: Near Whitesville, W. Va.

Operator: Name on request

Car Dimensions: Length 21'6"

Width 7' 6"

Height 31" (above rails)

Weight 8000 lbs. (empty)

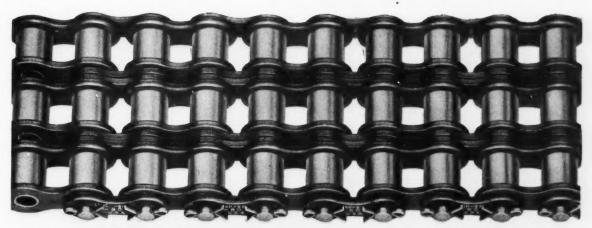
Capacity: 310 cu. ft. (level load)

390 cu. ft. (crown load)

where can you match it?

Since 1915 — Pioneers in haulage equipment

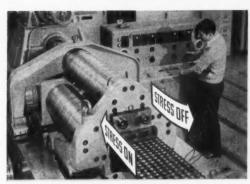






Arrows indicate critical areas treated with compressive stresses to improve fatigue resistance.

Fortified against fatigue



65 TONS OF CYCLIC TENSION! With this equipment—largest of its kind known to be in operation in roller chain testing—Link-Belt tests and rates roller chains. Rapid "stress-on, stress-off" action duplicates operating conditions at a greatly accelerated pace... proving over and over that Link-Belt chains are fortified against fatigue.

Link-Belt offers special FR® processed roller chain for applications involving repeated high-tensile loads

Jobs too rugged for standard roller chains are taken in stride by Link-Belt FR roller chain. Through its patented FR process, Link-Belt gives greater dynamic strength to the larger sizes of chain most likely to encounter severe cyclic loading. FR greatly raises the chain's endurance limit by compressing metal around pitch holes—the critical sidebar areas most vulnerable to fatigue failure.

The FR process results from the same design and metallurgical research that has produced many more "extras", all *standard* in Link-Belt roller chains. They include shot-peened rollers, close heat-treat control, lock-type bushings and others. For further details on Link-Belt roller chains, send for Book 2657.





BOOK 2657 has 154 pages of roller chain data. For your copy, contact your near-est Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

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LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.



PRESIDENT'S AWARD for full year without a lost-time accident is aumired by Leyester de Porter (left), safety committeeman; Maurice Fowler, safety engineer; Hubert Windows, safety committeeman; and Charles Bliss, chairman, safety committee.



of Hardwick operations, is safety booster, as are all Duquesne Light Co. executives.



THE SACETY KECORD, 417 days without a lost-time accident is pointed out by Mr. Truax to committee and Mr. Fowler.



SAFETY BANNER, changed every month, flies near mine shaft. It is an effective reminder in safety campaign.

Harwick's Big Year in Safety

NO LOST-TIME ACCIDENTS from Dec. 9, 1958, to Feb. 1, 1960-and still going strong-is the accomplishment of an enthusiastic safety-minded organization at Duquesne Light Co.'s Harwick mine, Harwick, Pa. This positive safety attitude begins with Duquesne Light's chief executive, spreads to the company's mines and power plants, and then down through the supervisors to all employees. Mine officials emphasize that labor cooperates fully in the safety program and note that much of the success of the program is the result of employee efforts.

Up to Feb. 1, 1960, Harwick had worked 418,105 man-hours without a lost-time accident while producing 571,476 tons. Management and labor are teaming their efforts to extend this record by maintaining safety enthusiasm at a high level and spotting potential hazards before accidents happen.

What the Company Does.

Harwick Superintendent J. H. Truax says that foremen make it a point to caution the men every day on safety problems. He also points out that nobody can relax for a minute and when foremen and workers get to thinking that way it's about all one can do after following all of the safety rules.

Duquesne Light's top management takes the lead in boosting safety and expects mine management to keep the properties safe. This attitude is more than lending lip service to safety. For example, Duquesne Light's chief executive issues an annual gold seal award for any operation having no lost-time injuries for a year. Furthermore, the chief executive or another member of the com-



COO. EAATION between mine safety committee and safety engineer provides the foundation for an effective safety program. Employee suggestions on safety or elimination of hazards are relayed to Mr. Fowler.



SAFETY MESSAGES are posted on bulletin board in lamphouse under a row of awards for safety achievements, by Maurice Fowler, Harwick safety engineer.

pany's management makes it a point to visit any property having an outstanding safety record. The company also provides safety awards for each mine employee on completion of a quarter year of accident-free operation of the mine. The award may be a useful item, such as, a wallet or 6-ft pocket rule.

Regular safety meetings play an important role in the Harwick safety program. Once each month each unit foreman takes 15 min at the start of the shift to discuss any accident, whether a man lost time or not, that happened at the mine. Foremen sometimes pick up useful information from accidents described in the Safety Sentinel, published by the Pennsylvania Department of Mines,

and offer it as food for thought at the meeting.

To provide the foremen with timely topics for these meetings, Harwick's safety engineer meets with them to summarize conditions needing attention and to discuss any accidents or near accidents. During the underground meetings crew members are encouraged to make constructive suggestions on how safety can be improved or a hazard eliminated. Foremen report these suggestions to the safety engineer, who analyzes and evaluates the recommendations and then takes any steps necessary to correct the condition.

Foremen and supervisors also hold regular monthly safety meetings. Confined to safety topics and limited to ½ hr, the meeting moves at a rapid pace. In addition to discussing the points listed for the face meetings, the group takes up any points noted by Superintendent J. H. Truax or by Safety Engineer Maurice Fowler as showing signs of laxness.

Duquesne Light's mine supervisors also attend district meetings of the Holmes Safety Association and hear discussions of any accidents that occurred at any of the seven other mines in the district. Foremen bring back ideas from these meetings to supplement company material for the underground meetings.

Harwick's management also spends a great deal of time discussing near accidents, such as, roof falling on a continuous miner without injuring the machine operator. Since conditions were right for injury of a worker, management believes that analyzing a near accident is as important as studying a lost-time accident. Furthermore, Harwick's mining engineer makes sketches of all near-accidents and all lost-time accidents, which are studied and then filed.

Selling Safety

Harwick officials believe that you must continually work at safety if you want to have a good safety record. They also say that holding safety meetings regularly and then forgetting safety until the next meeting is not effective. Strategically located bulletin boards in the lamphouse, near the shaft and underground on the section carry the safety message to employees with timely posters on mining hazards. An effective attention-getter on the outside bulletin board is a notation of the number of days worked without a lost-time accident.

Duquesne Light also participates in the National Safety Council's campaign to prevent roof-fall accidents. This campaign includes five types of safety reminders, as follows:

1. Large monthly posters for outside bulletin boards and small posters for underground display.

2. Roof safety tips—usually a small leaflet which is distributed at one of the weekly underground meetings or placed in pay envelopes. The company often adds a personal appeal by typing employees' names on the leaflets.

(Continued on p 112)

The Company
that cares enough
to give you
the best!

Massco-Grigsby

PINCH VALVES



RUBBER, NEOPRENE for Corrosion and Abrasion

- 1" to 14" inside diameter.
- Pressures to 150 psi.
- Temperatures to 200° F.
- Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.



- · Cannot leak or stick.
- No working parts in contact with pulp or liquid; no packing glands.



- Unobstructed flow eliminates high friction loss.
- Remote control available.
- Can be equipped for automatic regulation.



- Split flanges and patented Flex Seal ends assure perfect seal.
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- 3. Reflective safety signs for underground display.
 - 4. Stickers for miners' caps.
- 5. Large banners, renewed each month, for display on the surface near the portal.

In recognition of the no lost-timeaccidents record for 1959, Duquesne Light presented each Harwick employee with a serviceable engraved wrist watch. For each quarter of the year the mine works without a losttime accident the company presents other awards, including, pen and pencil sets, knives, wallets, etc. Employees value these awards not only because of their intrinsic value but also as a token of appreciation for a job well done.

Sponsoring a first-aid team is another way Harwick mine sells safety. Mine officials note that when a mine has a good first-aid team the miners talk about first aid and, as a result, are more safety conscious. Furthermore, men trained in first aid tend to be safer workers.

How the Mine Safety Committee Helps

Harwick's mine safety committee, consisting of Charles Bliss, chairman, Leyester de Porter and Hubert Windows, plays an important role in the company's safety campaign. Mine management credits the efforts of committee members with much of the success of the safety program. These men have a combined mine experience of 93 yr and most of this has been at the Harwick mine.

Management notes that these men take their safety responsibilities seriously and have a positive attitude toward safety, cooperating fully with mine officials. They approach their

safety job with the attitude of preventing accidents and not of finding fault. Furthermore, because of their long and varied experience in the mines, they know what can or cannot be done to eliminate a hazard. Because of their alertness and dedication to their safety job they sometimes become aware of a potential hazard before management. For example, they noted some horseplay in the bathhouse and tried to stop it through their own efforts. Not satisfied with their results, they enlisted the help of the safety engineer who posted a notice on the bulletin board, which pointed out the possibility of a bathhouse accident spoiling a perfect underground record. This message provoked some sobering thoughts and ended the horseplay.

Once each month the safety committee attends a meeting of all similar committees representing eight major mines in the Allegheny-Kiski valley. Discussion of lost-time accidents and how they can be prevented provides useful material for safety discussions at the UMW local meetings. In addition to discussing accidents at the other mines, the mine committee has the responsibility of leading discussions of any Harwick accidents. They group accidents into no-lost-time, lost-time and eye-injury categories for discussion purposes

Committeemen report that the men are very attentive and contribute to a lively discussion of safety problems. They also point out that Harwick management cooperates fully with them and, as a consequence, their job is easier. The safety committee also notes that the local UMW officers actively support the safety program, which also helps build enthusiasm among the workers.

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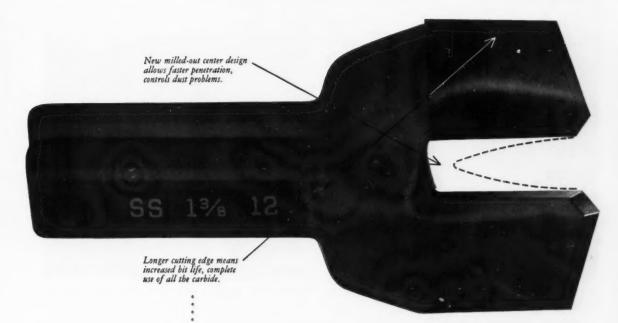
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The outstanding performance of Carmer's Style SS roof drill bit has been proven over the years in tests and under actual operating conditions in mines throughout the country. This sturdy mining bit consistently drilled faster, cleaner and more accurately than others on the market.

Now, the newly modified milled-out center design of the SS Bit allows freer passage of large cuttings for even greater drilling speeds. It can save you up to 25 percent drilling time. The problem of dust control at the face is practically eliminated.

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WSW 7192

The Original DOUBLE-BONDED Carbide Cutter Bit





W. A. STAPLETON (left), Clinchfield's division superintendent, and Harry Fisher, explosives-company representative, plan carefully for improved face preparation.



ROUTES OF SUPPLY and locations of magazines are planned to fulfill safety requirements and to insure that supply procedures will not be a source of delays.

Thick-Seam Face Preparation

PREPARING CUTS of coal for loading at Moss No. 3 mine requires some special approaches because of the varying thickness and character of the coal. The Tiller and Jawbone seams are mined together as a single seam in which mining height may vary from a low of 10 ft to a high of 18 ft. The parting between the seams comes and goes in a range of thickness of from a few inches to 30 inches.

As explained in the case histories of mining and preparation at Moss No. 3 in the July, 1959, issue of *Coal Age*, the object is to produce both metallurgical and steam coal. Size consist is an important consideration. Furthermore, a number of the machines have been specially designed for use in this high coal to create high-

capacity production units. Highly efficient face-preparation methods are a must.

The system at Moss No. 3 is based upon multiple shooting using specified American Cyanamid permissible explosives and Coal King delay caps with millisecond delays, the latter a new Cyanamid product. The final system, which is based upon a program of thorough research, was worked out by Clinchfield officials.

The full program included all steps from testing various drill and cap patterns and permissible explosives to get the desired size consist and good loadability to training the shotfirers in multiple-shooting practices.



As shown in the accompanying diagrams of shooting patterns at Moss No. 3, initial relief for the shooting is usually provided by a center or side shear through the lower Tiller seam and a horizontal cut across the face in the Tiller below the rock parting. All cuts are 10-ft. deep from the face to back of cut; width of openings is 16 ft.

From 13 to 18 drillholes are required per round with normal patterns as shown in the diagrams for a 10-ft seam thickness (Face A) and an 18-ft height (Face B). Cyanamid Coal King delay caps Nos. 1, 4, 7, and 9 with timings of 25, 100, 175 and 225 milliseconds are employed to achieve breakage in the desired stages. Charges primed with No. 1 delays are the openers, working toward the relief provided by the cut and shear. The No. 4 and No. 7 delays initiate the blasts which drop the major portion of the cut and charges with No. 9 delays "square up" the top corners.

The explosive is American 11, 1½ x 8-in permissible, which was the final selection after extensive tests of other



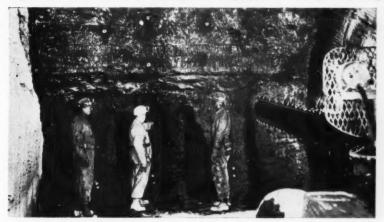
SPECIAL CAR is used to distribute supplies once a day for three shifts. The car is lined with wood as a safety precaution.



EXPLOSIVES CAR is loaded at surface magazine. Supplies are then hauled to underground magazines.



ALL FACE UNITS, such as this self-propelled roof d ill, are specially designed for operation in coal up to 18 ft.



UNIVERSAL CUTTING MACHINE cuts and shears to a depth of 10 ft in 16-ft-wide places. Roof is bolted at the face before the face-preparation cycle begins to provide maximum safety for workmen.



SHOTT.RER carries explosives in plastic bag, enough for a cut. Millisecond caps are in wood carrier.



SERVICE MAN, representing explosives manufacturer, provides instruction for shotfirer in preparing primers and charging drillholes. Compartmented carrier in foreground is used to keep caps separated according to delay.



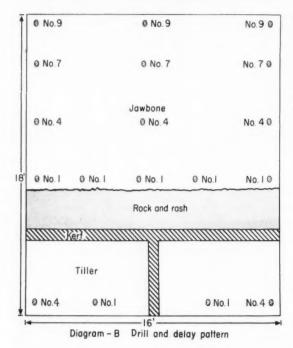
PROPER PLACEMENT of primers and the remainder of the charge and good stemming with tamping plugs and clay-filled dummies are important in getting the desired breakage in the thick coal at Moss No. 3



DELAY CAPS, Nos. 1, 4, 7 and 9 furnish a blasting sequence that opens the cut, drops the major portion of the coal and "squares up" the corners.



CHARGES in all holes are wired in series. Foreman tests for gas as a final step before lead wires are connected to firing cable. Roof has been bolted.



explosives. This combination of American 11 and short-delay blasting provides a cut of coal of optimum size consist in a confined area for easier loading. The loading machines are faced with very little cleanup work because the coal is heaved into a pile at the face rather than thrown about.

Corner holes are charged with four to five 1½ x 8-in cartridges of the explosive and interior holes in the round are charged with four cartridges. Indirect priming is utilized by having the Coal King cap inserted in the first cartridge entering the borehole with the nonprimed end

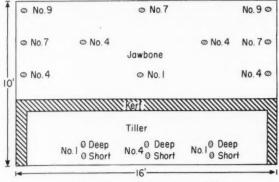


Diagram - A Drill and delay pattern

of the cartridge facing towards the collar of the hole.

Charges are stemmed with a Permaseal tamping plug immediately out by the explosive or by clay-filled tamping bags. All caps are wired in straight series and connected by a firing cable to the source of power.

Manpower and Methods

Production crews at Moss No. 3 include 12 men and the unit foremen. Duties of the men are as follows: A loading-machine operator and a helper, a shotfirer and a helper, two roof bolters, a utility man and a mechanic. The utility man advances compressed-air lines for the roof-bolting operation and performs other duties.

Handling Explosives

A 24-hour supply of explosives for each section (three shifts) is brought into the mine each day and stored in a wooden magazine which is kept a distance of 300 ft from the face.

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FIRING-CABLE conductors are untwisted and connected to terminals of blasting machine before shooting.



RESULTING CUT OF COAL is well contained for speedier handling by highcapacity loading machine. Breakage is good and fines are at a minimum. Tests have shown that 67% of this coal is plus % in.

A shotfirer carries a bag of explosives from the magazine to the face to charge the drillholes in each cut. He also carries a specially designed box in which the caps of varying delay intervals are assorted.



2 Separate Brake Systems

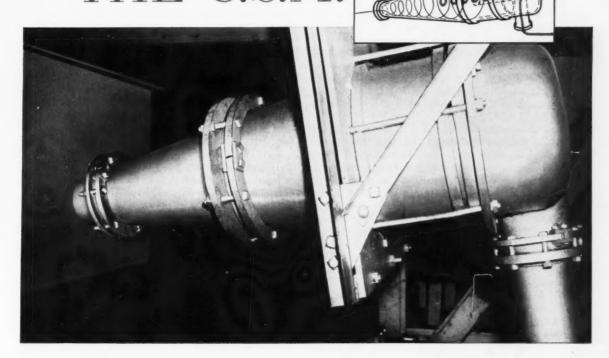
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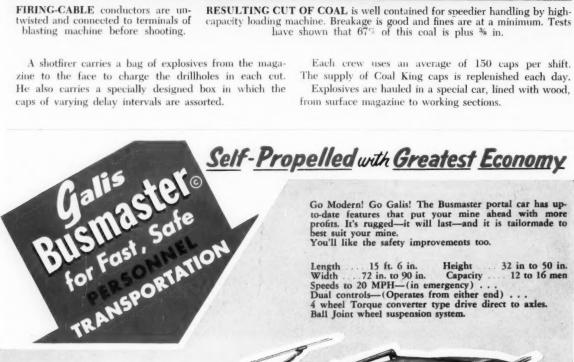


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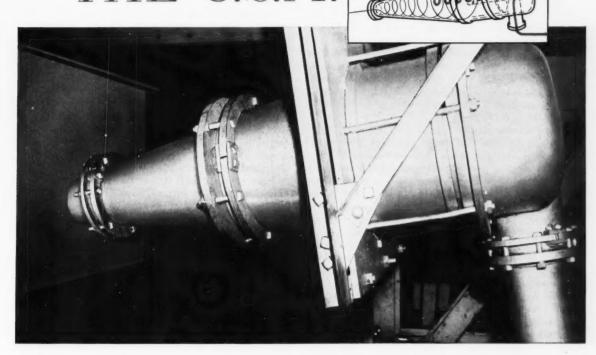
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Regional roundup of projections for . . .

Fossil Fuels in Power Plants

THE ELECTRIC UTILITIES of the United States will require 40% more fossil fuel by 1965, 70 million more tons of coal, 31 million more tons of gas and 4 million more tons of residual oil.¹ Gas shows the largest percentage increase with an average for the next six years of 9%, with coal at 7% and oil at 3%. Percentage of fossil fuels used under electric utility boilers will change but little during these six years, in fact coal's rate is projected to 1965 at the exact 1959 figure of 66.6%. Gas shows a slight gain, from 25.4% to 26.6% with oil moving down from 8.0% to 6.8%.

These conclusions are derived from a survey of the utilities by *Keystone Coal Buyers Manual*, a McGraw-Hill publication, in which nearly 200 electric utilities representing close to 80% of the total national fuel burn replied.

This study must be interpreted only to represent the composite views of some 200 electric utilities during November and December, 1959, and January, 1960. No attempt has been made to foresee major changes in the political situation, the world economic picture, or even in the always current competitive in-fighting for the world's fastest growing fuel consuming market. Many things can change the picture drawn in the following paragraphs including U. S. oil-import quotas, a Canadian decision to export gas, world vessel rates, railroad freight rates, etc.

Conclusion of this study is that coal demand will grow in every area, even in the highly competitive New England and Middle Atlantic regions. Oil will lose in coal competitive areas, while making some gains in gas competitive areas. Gas gains will be concentrated in areas not served by coal, except for one region, West North Central, but here coal's rate of growth will exceed that of gas, thus reversing a trend of more than 15-yr duration. Other areas showing increases for gas are the Pacific and West South Central Regions, the states of Idaho, Arizona, Nevada and New Mexico in the Mountain region; and the state of Florida in the South Atlantic region.

One of the major determining factors in selection of fuel is transportation costs, which are reflected sharply in the varied regional pattern of fuel consumption, which shows coal enjoying almost exclusive markets in all inland locations east of the Mississippi River with gas enjoying exclusive markets in the southern border states, and the adjacent states of Arkansas, Oklahoma and Nevada.

Major areas of competition are (1) New England-Middle Atlantic coastal areas, where imported foreign residual and pipe-line gas compete with coal (2) Florida, with gas invading oil markets in the southern part of the state, and coal invading oil markets in the northern part, (3) California, with oil and gas competing for a fast growing market (4) the West North Central and Mountain regions where gas competes with coal and (5) some of the Southern and East South Central states, where in almost 100% coal territory, gas has made contracts with a few utilities.

The Keystone survey, which included projections of fuel use through 1965 and expansion of generating capacity through 1962, when compared with the record, permits some valid conclusions as to future fuel demand, by regions.

NEW ENGLAND. The competitive edge now begins to shift to coal, with projections showing a gain of 40% or over 2 million tons by 1965, while oil gains by only 10% or less than ½ million tons. The gas invasion, highly publicized in 1954, reached a high of less than 5% in 1958, decreased a bit in 1959 and projections show further drops through 1965. New fuel-burning units going on line through 1962 also show this trend reversal, with six coalfired units and only two coal-oil units. Three utilities, Connecticut Light and Power, Public Service of New Hampshire and New England Power account for a total expected increase in coal burn by 1965 of more than 2 million tons.

MIDDLE ATLANTIC. Competition is limited almost entirely to coastal areas. Both oil and gas marked up real increases in 1958 and in 1959, but the trend will reverse, shifting back to coal, beginning in 1960. Consolidated Edison and Public Service of New Jersey, Philadelphia Electric, Atlantic City Electric and Long Island Lighting comprise the major competitive battle ground. Four of the five project declines in oil use, averaging about 20%, while two show declines in gas use with another one leveling off, resulting in our prediction of a 10% decline. Coal will be required to meet not only all of the increase, but also make up the oil and gas decreases. Projections show about 5 million tons increase in coal consumption by these five by 1965. New units through 1965 show three on coal, one coaloil and three coal-gas, with one oil (a peaking unit) and one nuclear.

Inland Pennsylvania projects an expansion of about 25% by 1965, all, of course, on coal, about 3 million tons.

Inland New Jersey and upstate New York are the only areas in the U.S.A. that project no gain for coal or for fossil fuels. Upstate New York will, through 1965, be getting expansion requirements from the St. Lawrence hydro developments and inland New Jersey will be shifting part of its needs to new modern stations across the border in Pennsylvania.

EAST NORTH CENTRAL. This is coal's back-yard and its biggest market. Projections show by 1965 an increase in coal use of 40% or about 27 million tons. There are in this region at least ten utilities whose coal requirements will expand by more than one million tons, each: Commonwealth Edison; Union Electric; Consumer's Power; Detroit Edison; Ohio Power; Ohio Edison; Indiana and Michigan; Wisconsin Electric Power; Public Service of Indiana and Illinois Power. Three utilities, each producing electricity to power nuclear fuel manufacturing plants, have reached capacity of about 9 million tons

All tonnage figures in this article are in terms of coal equivalent.

per year and no further expansion is planned. The one area of competition is gas in the Chicago area and along the lake shore as far as Toledo. Commonwealth Edison uses about 70% of this gas. Commonwealth Edison increased gas use by over 700,000 tons, or almost 50% during 1959, but in 1960 gas use will decline by about 1 million tons. This is the first coal-gas competitive area in the U.S.A., where constantly increasing gas prices have finally reached or passed coal's stable price level. Since 1951, gas has increased in price from 18.4 cents per million Btu to 24.2 in 1958, with another increase in 1959 probably to around 25 cents, while coal prices moved down from 25.6 cents in 1951 to 24.9 cents in 1958. One small utility, Superior Water Light and Power, shows a gradual shift from coal to gas, but most of the other gas users show a leveling off.

Forty new units are to go on line, 1959-1962. Thirty-six of these are coal, one (Commonwealth Edison) is coal and gas and three are nuclear (Commonwealth, Detroit and Central Utilities Atomic).

SOUTH ATLANTIC. This region divides into three distinct areas, competitively. The northern tier, Delaware, Maryland, District of Columbia, Virginia, West Virginia and North Carolina, are almost 100% coal users. They used 21 million tons of coal in 1959 and project an increase of close to 50% by 1965. In this area, there are only three publicly owned utilities that use some gas, with one municipal, Danville, Va., almost 100% on gas and two naval installations that consume about 50,000 tons of oil each.

Gas, however, enjoys about 35% of the market in South Carolina and Georgia, but projections show continuing declines. Coal shows a projected increase in excess of 1 million tons, despite the fact that some future electricity will be imported into Georgia from Alabama.

The third competitive area is Florida, which is divided into two parts:

1. The south with gas moving into oil territory. Gas burned in 1959 totalled over 2 million tons or almost 30% of the state fuel burn. Gas burn in 1960 is projected at close to 4 million tons, but with little further gains through 1965. Oil use decreased by almost 1 million tons in 1959, projections show a further loss in 1960, but from 1961 through 1965 an increase of 70% or about 3 million tons.

2. The north with Tampa Electric and Gulf Power increasing coal burn in 1959 by more than 50% and projecting a further increase of about 1 million tons by 1965. The eight units to go on line 1959-1962 confirm these trends, with two gas-oil units in the south, two coal units in the north and four oil units.

EAST SOUTH CENTRAL. By fuels, this region is sharply divided. Kentucky and Tennessee are almost 100% coal burners, Alabama over 90%. Some gas is used by Alabama Power, Louisville Gas & Electric and the City of Memphis. The first two project a declining use of gas, while Memphis projects a steady supply.

Coal gain is projected 1959-1965 at about 55% or 14 million tons. Biggest gain in the nation is shown by Tennessee Valley Authority with a projected 7 million ton increase, and this is by 1963, with no figures beyond. The newly formed Southern Electric Generating Co. ex-

Change in Electric Utility Demand for Fossil Fuels 1959 1965, by Regions

Increased Demand for Coal, 1959-1965, By Regions

		Project by	Pro-		
Region	Con- sumption 1959		Tonnage Increase	jected Coal Demand	
	(000's Tons)	Per- cent	(000's	Tons)	
New England	5,647	+40	2,000	7,600	
Middle Atlantic	32,618	+25	8,000	40,600	
South Atlantic	25,752	+45	12,000	37,700	
East South Central	25,239	+55	14,000	39,300	
East North Central	67,490	+40	27,000	94,500	
West North Central.		+50	4,500	13,800	
West South Central.	0	0	0	0	
Mountain	2,253	+110	2.500	4.700	
Pacific	0	0	0	0	
Total	168.375		70.000	238.200	

Change in Demand for Oil, 1959-1965, By Regions

		Project b	Pro-		
	Con- sumption 1959		Tonnage Increase	jected Coal Demand	
Region	(000's Tons)	Per- cent	(000°s	Tons)	
New England	3,873	+10	+ 500	4,400	
Middle Atlantic	6.057	-20	-1.200	4,900	
South Atlantic	4,423	+70	+3,000	7,400	
East South Central	12	-	-	12	
East North Central	67		***************************************	67	
West North Central.	77		amoun.	77	
West South Central.	67	-	-	67	
Mountain	535	-	MANUEL	500	
Pacific	5,122	+30	+1,500	6,600	
Total	20,233		3,800	24,000	

Change in Demand for Gas, 1959-1965 By Regions

		Project b	1965 Pro- jected		
	Con- sumption 1959	P	Tonnage Increase	Coal Demand	
Region	(000's Tons)	Per- cent	(000's Tons)		
New England	505	-50	- 250	250	
Middle Atlantic	4.059	-20	- 800	3,200	
South Atlantic	4.759	+45	+2,000	6,800	
East South Central	2,304	-	-	2,300	
East North Central.	2,855	0	0	2,800	
West North Central.	9,008	+40	+3,600	12,600	
West South Central.	24,503	+60	+14,700	39,200	
Mountain	4.741	+110	+5,200	9,900	
Pacific	11,420	+60	+ 7,000	18,400	
Total	64,190		31,450	95,450	

pects to consume 2½ million tons by 1965, most of which they will produce in their own coal mines. Alabama Power and Kentucky Utilities will each add ½ million tons

Mississippi, of course, is almost 100% gas, the lone exception being the City of Greenwood, which used 4 thousand tons of coal in 1959 and has ordered gas-

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coal firing for their new unit. A 30% increase by 1965 would add about 400 thousand tons gas to 1959's total of 1,257 tons, which would just about balance the loss in the three coal burning states.

New units to go on line through 1962 confirm this trend, with eleven new coal burning units, including two 500-mw and one 600-mw in Alabama, Kentucky and Tennessee and two gas-burning units in Mississippi.

WEST NORTH CENTRAL. With only a few years showing exceptions, gas has gained steadily on coal in this region from 1946 to 1959, from 36% of total to 53%. In 1959, coal bettered 50% for the first time since 1949. Projections ahead indicate a 50% increase for coal and a 40% increase for gas in this region, about 4½ million tons coal and 4 million tons of gas. There is one exception to the pattern of steady year by year increase in use of coal and gas. Missouri Public Service, using almost 100% gas, is going on line with new units in 1960 and 1961, both coal burners, with coal use increasing from 17 thousand to 382 thousand tons and gas use decreasing by about 50% 1960 through 1964, but in 1965 again hitting the 1959 total.

WEST SOUTH CENTRAL. This is the back-yard of the gas industry. The story in this region is simple, gas, with one exception of a few thousand tons of coal at Raton, and another exception of a large tonnage in Texas, which does not appear in official records because this power generation is considered captive. A 60% gain, or almost 15 million tons increase is projected 1959-1965. New units on order do not conform to this pattern. For the first time, dual-fired units, gas and oil, are to go on line, one in Louisiana and four in Texas, with total capacity of 676 megawatts. This is one area where it appears that oil might make some competitive gains.

MOUNTAIN. Through the decade of the 50's gas and coal have divided this market about 75-20, with oil (pitch) enjoying one refinery-generating plant pipe line business of about 500,000 tons per year. The northern states of Montana, Wyoming, Colorado and Utah are the coal and gas burners. The southern tier of Nevada, Arizona, and New Mexico are the 100% gas burners. Projections show a consistent gain totaling about 110% for each fuel, some 21/2 million tons of coal and 5 million tons of gas. New units on order conform to this pattern, except in Arizona and Nevada, where dual oil and gas burning equipment is being installed on units going on line in 1960, 1961 and 1962. Four units with 396 megawatt capacity are involved. Added to Texas and Louisiana, this gives oil a first break into four states with a solid record of burning almost 100% gas.

PACIFIC. This is the battle-ground of oil and gas. The record shows gas has increased its share of the market from 19% in 1946 to 69% in 1959, while oil has declined from 77% to 32%. Projections show an increase in gas use 1959-1965 by about 60% or about 7 million tons, while oil shows only a 30% gain or about 1½ million tons.

The recent Canadian decision to permit export of natural gas into California at the rate of 9 million coal-equivalent tons per year may significantly alter these projections.



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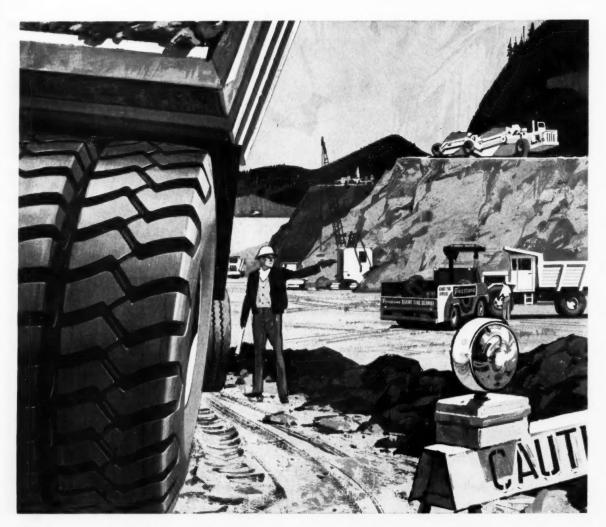
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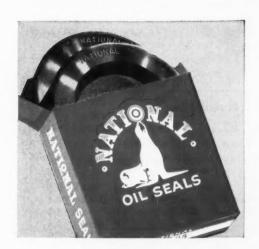


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Recent Economic Growth — The Numbers Game

If it truly portrayed recent rates of economic growth in the United States, the report on employment, growth and price levels recently issued by the staff of the Joint (Congressional) Economic Committee would point up scarcely less than a national disaster. Among other things, it would document impressively Premier Khrushchev's crack that "the capitalist steed the United States is riding... is worn out."

One of the major findings of the Joint Committee's staff (in the Eckstein Report, named for its staff director Otto Eckstein) is that between 1953 and 1959 the average rate of growth of physical output in the United States was only 2.4 per cent per year. This is scarcely more than half the average annual rate of growth of 4.6 per cent the staff found to have prevailed between 1947 and 1953.

Happily, however, the report does not reflect the basic economic realities. Its finding on relative rates of economic growth for the two periods is a statistical tour de force which, by the selection of certain figures and certain dates, distorts the record of America's long-term economic growth.

Playing The Numbers Game

By the selection of appropriate starting and terminal periods it is possible to document almost any rate of economic growth that is desired. The table at the bottom of this page shows you how this can be done. It will also show you how the Eckstein staff worked out its shocking contrast in growth rates. The table is built like a schedule of airplane fares between different cities. The postwar years 1946 through 1959 are put down on two axes. One runs down the left hand column, the other runs across the top of the table. Put your finger on the point where the two axes intersect and you have the average rate of growth for the period covered.

ANNUAL AVERAGE GROWTH RATES	OF THE	U.S.	ECONOMY,	1946-1959*
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(Percent increases, starting year to terminal year, of GNP in 1954 dollars).

7 1948 1 -1.9 3.8 X X	1949 -1.2 1.8 -0.1 X	1950 3.0 4.1 4.2 8.7 X	1951 3.9 4.9 5.3 8.1 7.4	1952 3.8 4.6 4.8 6.5 5.4	1953 3.9 4.6 4.7 6.0 5.1	1954 3.2 3.7 3.6 4.4	1955 3.7 4.2 4.3 5.0	1956 3.6 4.0 4.0 4.6	1957 3.4 3.8 3.8 4.2	1958 2.9 3.2 3.1 3.5	1959 3.2 3.5 3.4 3.8
3.8 X X X	1.8 -0.1 X X	4.1 4.2 8.7 X	4.9 5.3 8.1	4.6 4.8 6.5	4.6 4.7 6.0	3.7 3.6 4.4	4.2 4.3 5.0	4.0	3.8 3.8	3.2 3.1	3.5 3.4
X X	-0.1 X X	4.2 8.7 X	5.3 8.1	4.8 6.5	4.7 6.0	3.6 4.4	4.3 5.0	4.0	3.8	3.1	3.4
X	X	8.7 X	8.1	6.5	6.0	4.4	5.0				
X	X	X						4.6	4.2	3.5	38
			7.4	5.4	5.1						3.0
X	v				3.1	3.4	4.3	3.9	3.6	2.9	3.3
	^	X	X	3.4	3.9	2.0	3.5	3.2	3.0	2.2	2.8
X	X	X	X	X	4.4	1.3	3.6	3.2	2.9	2.0	2.6
X	×	X	X	X	X	-1.6	3.2	2.8	2.6	1.6	2.4
X	X	X	X	X	X	X	8.1	5.1	4.0	2.4	3.2
X	X	X	X	X	X	X	X	2.1	2.0	0.5	2.0
							X	X	1.8	-0.2	2.0
-							30	X	X	-2.3	2.0
X	X	X	X	X	X	X	X	X	X	X	7.0
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Following this procedure, you can find growth rates ranging all the way from -2.3 per cent, between 1957 and 1958, to +8.7 per cent, between 1949 and 1950, along with almost any other rate you would choose for various years and sequences of several years over the postwar period.

For example, if you want to demonstrate that the postwar growth rate through 1953 was less than 4% per year, you take off from 1946, include a drop of 0.1 per cent between 1946 and 1947, and come up with a growth rate for the 1946-1953 period of 3.9 per cent. But if you want to show it was quite high, you take off a year later, from 1947 (which drops out that dismal -0.1 per cent for 1947) and come up with a fine growth rate of 4.6 per cent for the 1947-1953 years.

Statistical Hocus-Pocus

That's what the Eckstein staff did. It took off at one end from a year when there was just about no growth, went to the Korean War boom year of 1953 at the other end, and got that average growth rate of 4.6 per cent. Then it took off from the Korean War boom year of 1953 and ran to the year 1959, when business was recovering from a recession and suffered through a steel strike of 116 days, to come up with its 2.4 per cent growth rate for the second postwar period. As the table indicates, by taking off a year later (1954) the average growth rate would have become 3.2 per cent, and if the take off had been 1949 it would have been 3.8 per cent.

There are those who, in nontechnical terms, would characterize this as statistical hocuspocus. There are also those who would see in it an element of political hocus-pocus, too. This is because the years 1947-53, when the Eckstein staff found there had been the healthy 4.6 per cent growth rate, were roughly years when we had a Democratic president, while the anemic growth rate of 2.4 per cent it calculated for the subsequent years was for years of a Republican presidency.

Actually it can be shown that the civilian part of our economy has had more rapid growth during the Republican administration than it had during the Democratic years. If military expenditures are subtracted from the national ouput, the resulting growth rate for 1953 to 1959 is slightly higher than for 1947 to 1953.

However, we do not question the bona fides of the Eckstein staff, But we do assert that it has produced a statistical picture of the postwar growth of the American economy which is dangerously misleading both at home and abroad.

Abroad, the report appears to give official documentation to the propaganda line that the Soviet economy is running rings around the U.S. economy in growth. and that it is Communism a country should choose if it really wants to develop rapidly. Building on a much smaller economic base than the U.S.A., the Soviet Union - as well as almost every less advanced nation

in the world - is bound to show a larger percentage increase in output than the U.S.A. But the Eckstein staff calculation gives the Communists ammunition they don't deserve.

Are We Facing A Crisis?

The contrast drawn by the Joint Committee staff in postwar U.S. growth rates suggests that we are facing scarcely less than a crisis through paralysis of our economic growth which calls for drastic remedies. But this, as the full 1947 to 1959 growth record set forth in the table makes clear, is very definitely not the case. Our over-all postwar rate of growth, as measured by the gross national product in physical terms, has been 3.5 per cent per year, a rate nearly double the long-term growth rate of 2 per cent per year between 1909 and 1939. In the continuing fluctuations in the rate of growth which more or less inevitably characterize a relatively free economy, we have had some downs in recent years. But our economy is now on the upbeat again. And at the end of this year, the U.S. economic growth rate for the postwar period can be expected to be 3.7 per cent per year.

It is extremely important for the United States to continue to maintain this rate of economic growth or even to surpass it. Upon this effort depends our capacity to meet our defense requirements without dangerous strain, to provide an adequate margin for foreign aid, to improve our own productive facilities, and to continue to raise our own standard of living.

How not only to maintain but possibly improve upon our postwar pace of economic growth will be the subject of strenuous debate in the months ahead, However, the debate will have a much better chance of being constructive if the postwar growth record is seen in proper perspective. To this end one of the first things to do is to junk panic rousing statistical portrayals such as that in the Eckstein report.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald CMCle

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Foremen's Forum

Managing the Small Coal Company

The operator of the small company must wear many hats. Here are some hints on effectively filling combined roles in planning, supervising, selling, record-keeping, financing.

IN OUR DEFINITION of a small coal company we mean one in which the success of the venture depends to a large degree upon the knowledge, experience, energy and plain guts of one man. Small coal companies can be successful provided this one man is fully aware of the scope of his responsibilities in today's business world. Books can be written—and they have been written—on the proper handling of the small-business details, but we shall confine ourselves on these two pages to a roundup of responsibilities, nine in number, as follows:

I Proceed on knowledge

Just about half of all small-business failures result from lack of managerial experience and knowledge. Especially in the highly competitive coal business it is necessary for the operator of a small business to have rather thorough knowledge of the technology of production and utilization. This includes a full knowledge of the economics of earthmoving, if the company relies on strip mining.

In addition to this technical knowledge, the small-company operator must possess or develop a knowledge of financing, sales, personnel administration and product marketing. This is a neverending process that results in the professional growth of the small-company manager. It is not enough to repeat one year's experience over and over again, even for the manager who decides to keep his company small.

2 Rely on budgets

A budget is not a strait jacket, it is a guide. Very often we think of budgets as applying only to money. Actually, time can be budgeted, and budgets of the company's time and money properly are employed in setting objectives for the enterprise and in providing yard-sticks against which performance can be measured periodically.

Remember that budgets can be flexible and elastic. We mean flexible and elastic, not loose and shifty. The owner of a small business who operates from a well-planned budget is better able to make a quick, sensible decision when he is faced with a change in conditions. If he is suddenly confronted with a need for funds to buy a new piece of equipment, he may be able to see items in his budget from which these funds can be diverted without strain. The man who has no budget would have to make a decision like this in the dark. The small businessman owes it to his employees, however few, to proceed on the basis of well-laid plans and budgets. He must also remember to include savings in his budget, in order to be able to replace capital equipment as needed.

3 Keep accurate books

Any businessman, large or small, who has directed his enterprise through one April 15th knows the importance of keeping accurate records. The troubles arising from underpayment of taxes and the burdens resulting from unnecessary overpayments can be avoided if accurate records of income and outgo are maintained. The question of how to provide this bookkeeping service is of major importance. Even in the very small business it may be advantageous to farm out the work to an expert, who may need only a few hours a week to keep books and accounts in good shape.

The slightly larger company will find that the services of a full-time book-keeper are well-worth the cost. One of the difficulties faced by the owner of the small company who tries to keep his own books is that of keeping them up to date. Too many other responsibilities cry for his immediate attention.

Accurate bookkeeping is helpful in (1) maintaining a fair proportion of liquid operating assets with respect to fixed assets, (2) keeping tabs on parts and product inventories and (3) promoting the proper action with regard to accounts receivable.

4 Recruit good people

The smallest of businesses will be required to hire people, and this may well

be the most important of all management functions. Somewhere in his own personality, competence and ability the manager of the small coal company will have to find the skills required to select, train, discipline and motivate his employees. The smaller the working force the more important these personnel activities of the manager become. Note the order in which these activities are listed. This is intentional. The selection of good men takes precedence. This should be followed by a conscientious effort on the part of the manager to provide training opportunities through which the selected men can develop themselves to their fullest potential. Throughout our travels we have come to appreciate and respect the ability and versatility of many of the chief lieutenants of small-company operators.

Discipline is not whiperacking. The root meaning of the word is in the Latin word discipuli, which means students. The disciples of the Nazarene were students, not pawns. Therefore, achieving discipline in a working force is a matter of teaching and leading.

Motivation is compounded of many things. High on the list are recognition and monetary return. The small businessman should be prepared to pay the going rate for labor in his area. He can't cut corners here, or he will end up with a disgruntled force or the rejects of other employers.

5 Promote sales

Advertising pays — but only if it is done right. Decide what your advertising must do for you. Do you want to announce that you are in business? Do you want to keep your firm's name before the public? Do you want to push a specialty coal? Do you want local, regional or widespread advertising?

Decide on what you want your advertising to do for you in terms of sales, then plan your campaign accordingly. Local papers, direct mail, business publications, radio time, outdoor signs, giveaway premiums, sponsorship of a local baseball or bowling team — all are possibilities. Just make sure you use the right tool for your purposes.

You should advertise or be aware that your broker or sales agency advertises for you if your entire output is handled in this manner.

(Continued on next page)

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Foremen's Forum (Continued)

6 Control operations

The owner-operator of a small coal company will have to give some attention to field operations, whether or not he has a chief of operations. This will be required to lay intelligent plans and to formulate budgets. One of the important considerations in this area is that the manager must insist that development work is carried out as it should be. If the company operates strip mines, there must be a reasonable amount of coal uncovered ahead of the loading operation. If the product is deep mined, there must be a fair amount of development in advance of the working sections. This is important because coal customers prefer an assured supply, which is something you can't offer if your development lags.

An extensive knowledge of operations is essential also to enable the operator to evaluate new equipment and its applicability to local conditions. The more the small-company operator knows about the operations, the more control he exercises over his costs.

7 Use credit wisely

The small-company owner should use credit for productive purposes. He should never find it necessary to go to the bank for cash to bail him out of his own management errors of the past. Intelligent planning and good budgeting will make such a drastic step unnecessary.

On the other hand, the business of banks is to make money available for productive purposes to those who demonstrate sound business habits and procedures. Look at it this way: The small businessman should maintain a reasonable cash balance to meet the daily costs, payroll and other short-term operating expenses of his enterprise. If he sees that a new item of equipment will make it possible for him to increase his efficiency, he has two ways to proceed. He can use his cash for the purchase, or he can negotiate a loan at the bank. In many instances it is better to borrow the money and preserve the cash balance of the company.

Of course the lending institution will want to be sure the borrower is a good credit risk. The best way for the small businessman to approach a lender is with a good set of books to show as evidence of sound business sense. He should also be able to demonstrate that his sales yield an adequate margin over costs, and that his cash balance and his fixed assets are in reasonable balance. On this latter point it is well to remember that a big investment in equipment and a huge inventory of clean coal are not the sole signs of corporate health. The operator with idle equipment and non-

moving inventory is virtually penniless, if his liquid assets — meaning cash — are gone.

8 Keep abreast

In big companies, where responsibilities are divided among a number of men, the business of keeping abreast of developments also is divided. The owner of the small business will be required to do a lot of this himself.

One way to make the job easier and more productive is to participate actively in the affairs of a local or regional operators' association. Attend industry meetings where the latest in equipment and methods are described, Read the business publications relating to your business. Visit other properties. Be alert in recognizing developing trends. Activities which may appear transient at first glance might prove to be, on closer examina-

tion, the beginning of a new trend in the business.

9 Gage the market

Events which may affect your markets are tumbling over each other these days. The population is growing and shifting. Yesterday's preferences are outmoded today. Be prepared to shift from domestic to industrial sales, or at least be aware of the possibility that you might have to make this change if you wish to stay in business. Maintain a sharp look out for new business—by following the trend of construction activities in your marketing area, for example.

These are some of the problems that must be faced by the small businessman. The health and growth of his enterprise depends upon how well he solves them

FACTS About Roof Falls

PREPARED BY THE ADVISORY COMMITTEE 1960 NATIONAL CAMPAIGN TO PREVENT INJURIES FROM BOOF FALLS IN COAL MINES





FOLLOW YOUR TIMBERING PLAN

The adoption of roof bolting and systematic timbering plans has been a big step toward eliminating errors in judgment in supporting roof. These plans have eliminated mistakes such as not setting safety posts when they should have been set, putting support in the wrong place, and not setting support close enough. Fortunately, the logic of systematic support for reducing roof fall accidents has spread rapidly throughout the coal mining industry.

For a roof support plan to be effective in preventing roof falls, and thus effective in preventing injuries, two factors must be present:

- The plan must be adequate to meet the normal roof support requirements of the particular mine for which it was designed, with a further requirement for additional support when conditions necessitate it.
- The plan must be followed in all cases without exception.

Information gathered by iederal and state agencies, and the Mational Safety Council, shows that 3½ per cent of fatal roof fail accidents occurred because the company's own roof support plan was not followed. This means that in a large member of cases men have lost their lives because known safety measures were neglected. It certainly is tragic enough to have accidents

from unforeseen or "unavoidable" causes, but it is folly of the worst kind for men to lose their lives because of failure to do what we know <u>must</u> be done to prevent accidents!

As we have noted, state and federal inspectors have often found mines violating their own roof support plans. The occurrence of a fatality caused many such mines to closely follow their support plans again. However, sad to relate, after a period of time, many of these same mines went back to their lax habits and further fatalities resulted.

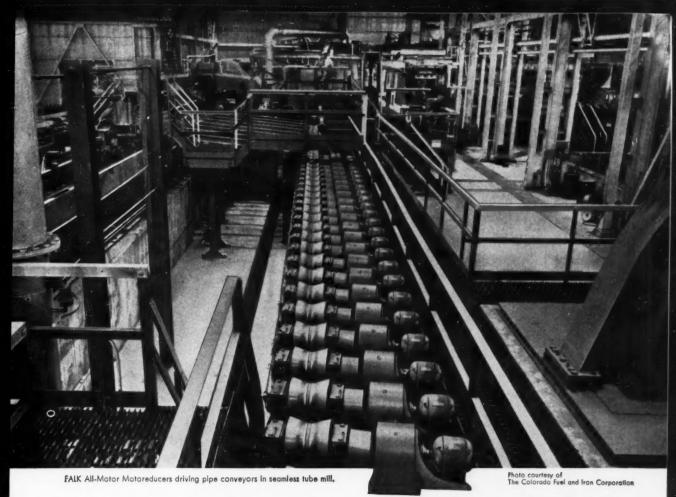
It is difficult to understand why a workman should have to be closely supervised in matters regarding the protection of his own life. But supervision has been found to be necessary! The fact that all of our states have found it necessary to employ highway patrolmen to enforce highway safety regulations, for instance, indicates that very few of us are as cautious as we should be to protect our lives, even on the highways.

It is a human trait to follow the line of least resistance and use less than the required support. This makes it necessary that the foreman not only give instructions to his men as to safe roof support procedure, but that he follow up to make sure his instructions are carried out.

The frightening death and injury toll

narieht 1950 National Safety Council

Planned Roof Support Cuts Accidents



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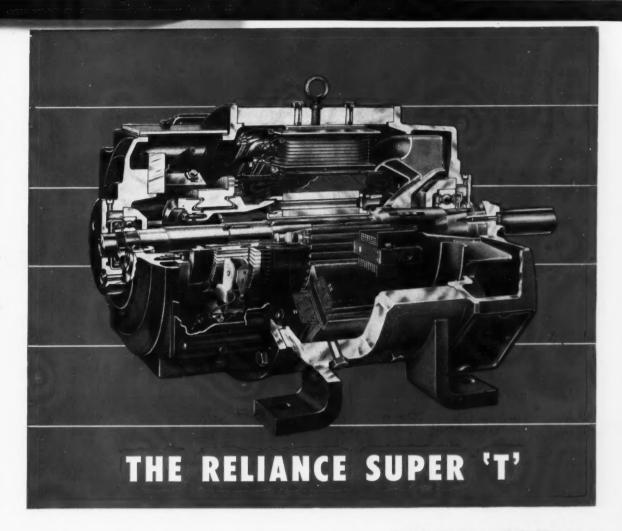
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Here is a motor built to make maximum use of d-c. flexibility. The Super 'T' puts Dynamic Response into starts, stops, and speed changes. Dynamic Response gives you a 50% increase in torque and a 50% decrease in reaction time.

This top performance is due to advanced balanced design. Lighter, small diameter armatures cut mechanical inertia 50%. Superior Class B insulation, gives extended life even at temperatures as great as 130°C.

Top grade insulation plus engineered ventilation lets the Super 'T' take tremendous overloads. In fact, the Super 'T' can develop double normal horsepower during starts, stops, and speed changes.

The Super 'T' is a compact power package, designed inside and out for tough industrial service. From appearance to performance, the Reliance Super 'T' with Dynamic Response is today's most modern industrial motor.

C-1577

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ENGINEERING CO.

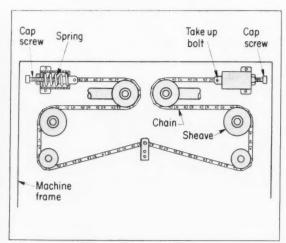
Dept. 65A, CLEVELAND 17, OHIO Canadian Division: Toronto, Ontario Sales Offices and Distributors in Principal Cities



Buty Master A-c. Motors, Master Gearmotors, Reeves Drives, V*S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

Operating Ideas



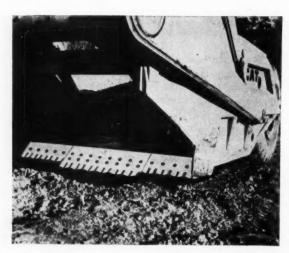


Miner Swing Chain Repaired Easier and Safer

ONE MAN now can repair a broken swing chain on a Joy 4 CM continuous miner more safely and efficiently as the result of an idea suggested by Louis H. Koprivnikar, mine mechanic at Harwick mine, Duquesne Light Co., Harwick, Pa. The idea earned a \$100 suggestion award for Mr. Koprivnikar.

Mr. Koprivnikar, shown demonstrating his development, suggested that the housing enclosing the coil spring that keeps the swing chain under tension be tapped so that a cap screw could be inserted and used to compress the spring and provide slack in the chain. As a result of this suggestion one man now does a job that

formerly required two men. Furthermore, the new method eliminates the hazard of injury to men making the repair. In the past mechanics used a bar to compress the spring and there was always the hazard of the bar slipping and injuring a man. All the mechanics need now is a wrench to turn the cap screw.



Twisted-Tooth Blade Increases Scraper Efficiency

RECENT field tests held at the Texas A & M heavy equipment operator's school, engineering extension service, lend strong support to the claim that twisted-tooth blades increase scraper

efficiency. Tests were made under the direction of R. L. Peurifoy, well-known authority on construction methods and equipment.

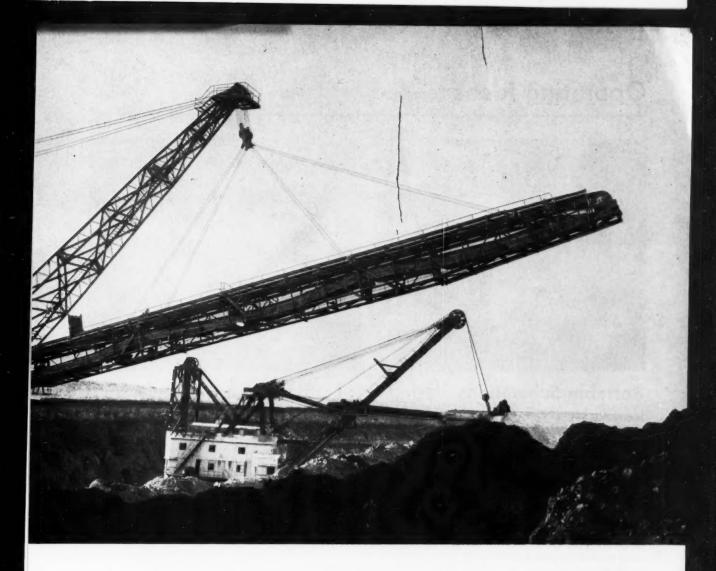
Two identical borrow pits were staked for the test, both located in hard clay and sandy clay characterized by high loading resistance. The volume of earth excavated was calculated by cross-sectioning the pits before and after each loading.

A Caterpillar DW 15 scraper, push-loaded by an International TD 20, was operated for two 40-cycle tests. In the first series a straight-edge blade was used; in the second, this blade was replaced by a twisted-tooth blade.

Mr. Peurifoy reported the following results: "The distance required to load the scraper was measured for each load, and the average computed. Our figures show that load travel distance averaged 161 ft with the twisted-tooth blade and 225 ft with the straight edge. Furthermore, the twisted blade load contained 9.02 cu yd by bank measure—1.02 yd more than the straight-edge load."

Converted to dollars and cents, the test figures assume real significance. According to Mr. Peurifoy's book, Construction Planning, Equipment and Methods, the average cost per yard for moving dirt is 40 to 50 cents. In a typical operation, assuming a travel distance from borrow pit to dumping area of 1,600 ft plus a productive hour of 45 min, the scraper will average about nine cycles in an hour or 90 cycles in a 10-hr day. Adding an extra yard to every load would increase production by 90 cu yd a day, boosting income \$36 to \$45.

Marketed under the name 'Gator Twistooth, the twisted tooth is a patented blade design of Shunk Mfg. Co., Bucyrus, Ohio.



A quarter century of success with Yellow Strand Wire Rope speaks for itself at Truax-Traer's Fiatt Mine

Truax-Traer depends upon Yellow Strand on many of their key machines, including this big 33 cu. yd. shovel equipped with Yellow Strand 6 x 41 Lang Lay Wire Rope. Truax-Traer has used Yellow Strand Wire Rope for 25 years.

In 25 years there is plenty of opportunity to know the ropes—to compare records,

service, quality, availability. So you can be sure that B & B has earned and deserved Truax-Traer's confidence. See your B & B distributor for prompt delivery. Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

Hellow Strand.







Operating Ideas (Continued)





Portable Substations Slash Relocation Costs

PORTABLE SURFACE SUBSTATIONS are now disconnected, loaded on a tractor-trailer, hauled to a new site and reinstalled ready for service in 10 hr at Warwick mine, Duquesne Light Co., Greensboro, Pa. Cost of relocating a portable substation is \$1,125, including labor, material and transportation. This cost is \$5,075 less than the \$6,200 relocation expense before the portable units were developed. Furthermore, the previous moving cost did not take into account any lost tonnage or abandonment of a substation building with little or no future use at the mine.

Warwick's latest feat in substation relocation is successful transportation of a Hewittic 750-kw glass-tube-type rectifier. This job was done without removing the large glass tubes or any of the auxiliary equipment. Hewittic's representative reports that this is the first time a Hewittic rectifier for mine service has been relocated without first being dismantled.

A 12x24-ft prefabricated metal building houses the substation. This structure is mounted on a rigid-frame base made up of 6-in I beams on which ¼-in steel plates are welded to support the substation, which is permanently installed in the building. When controls and equipment are rewired and installed, the unit becomes a permanent portable unit.

In relocating the unit it is only necessary to disconnect the AC power supply lines, the DC feeders to the mine and the grounding system. The building then is pulled onto a tractor-trailer and hauled to a new location and unloaded on some previously built concrete piers. It is then reconnected for service. These moves are made on Saturday and thus do not interfere with mine production.

The old system of relocating substations was slow and expensive. It included constructing a new concrete-block building to house the substation, disconnecting the AC and DC equipment at the old station and then moving all of the components to the new building for reinstallation. This move required an equipment outage of about one week and resulted in decreased tonnage.

As a result of the success of the portable units, all Warwick substations are being converted to portable stations when they are due for relocation.

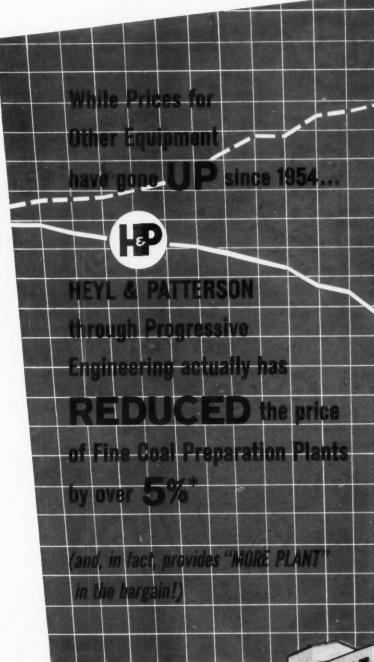
Impact Tool Opens Car Doors Easier

A JOB that formerly took 42 min is now done in 8 min as the result of substituting a power tool for hand methods, according to *The Internationalite*, published by the International Minerals & Chemicals Corp.

Every one of the discharge doors on the hopper cars loaded by International Minerals must be opened to clean out traces of the car's last load and make sure it will not leak when reloaded. While the company's better-methods class was studying this operation, T. O. Cassels (center) suggested it might be easier to do the job with an impact tool instead of the long bar formerly used. C. F.



Pregenzer (left) adopted the project, determined the best tool and installed the new method. Elmer Davis demonstrates the new method.



Here is how we did it:

Conducting a diligent and continuous research program, we developed new products and processes for coal preparation. You too have successfully used some of these products:

- H & P Fluid Bed Dryer
- H & P Cyclones with the new 24" and 36" sizes
- H & P Sieve Bend
- Reineveld Centrifuge

We point with pride to the real service we have rendered to the Coal Industry by being instrumental in successfully combatting inflationary trends.

In addition to lowering the initial investment, we reduced operating and maintenance costs.

In a competitive market such as coal, this means more profit opportunities for the users of H & P equipment.

Discuss your requirements with H & P engineers whose experience is at your disposal to conceive a preparation plant best suited to your own operating and marketing conditions.

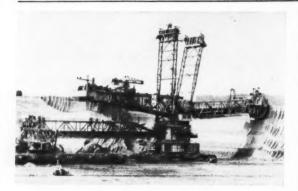
Whether you require a "turn-key" job or prefer a cooperative effort—remember: When Experience Counts— Count on Heyl & Patterson!

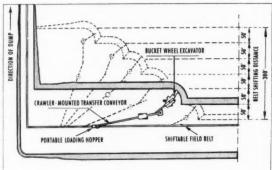
*Comparing on a "cost per ton of plant feed basis," the actual purchase prices of similar plants, one sold in 1954, the other now under construction.



HEYL & PATTERSON, Inc. 55 FORT PITT BLVD., PITTSBURGH 22, PA.

Equipment Developments





German Bucket-Wheel Excavator to be Sold Here

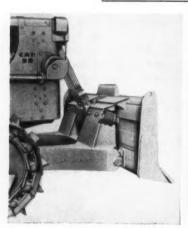
Link-Belt Co., Chicago 1, has acquired sales rights in the United States and Canada for the West German-built LMG bucket-wheel excavator. The machine, built by Orenstein-Koppel & Lubecker Maschinenbau AG, known as LMG, comes in sizes designed to dig from 200 up to 13,000 cu yd an hour.

Link-Belt president, Robert C. Becherer, said his firm would sell the LMG wheel in conjunction with its new line of high-speed, high-capacity belt conveyors. This combination will result in continuous low-cost, high-speed digging with the economies of belt-conveyor transportation, Mr. Becherer declared.

LMG has built almost 100 of its bucket-wheel excavators since it began manufacturing them in 1936. The biggest machine, said to be the world's largest, weighs more than 15 million pounds and has maximum cutting height from one bench of 295 ft. The wheel is 52 ft in diameter with 15 digging

buckets and 13,000 cu yd per hour capacity.

The rotating digging wheel, with buckets on its periphery, is used in openpit mining operations for large-scale removal of earth, overburden, sand, gravel, certain ores and lignite. The wheel, at the end of a boom, scoops up overburden and drops it at a uniform rate upon a conveyor within the machine, and thence to other conveyors or cars.



Cushion-Dozer



C-Frame



Cushion Push Block

Better Pushloading

Caterpillar Tractor Co., Peoria, Ill., has come up with three new products pegged to increase pushloading production and reduce pit cycle time. Two of the new tools, the inside-mounted No. 9C "Cushion Dozer" and the case-mounted "Cushion Push Block," permit approach and contact of tractors at relative speeds up to 3 mph. The third tool, a rear-mounted tandem pusher C-frame, is designed for use on tractors equipped with standard bulldozer blades.

The 9C Cushion-Dozer and the Cushion Push Block absorb the shock of pushtractor contact with scrapers at higher-than-normal speeds, resulting in more production, according to Caterpillar. Cushioning of the 9C, which is available for the D9E tractor only, is accomplished with four rubber springs, each made up of eight rubber discs. The Cushion Push Block, for either the D9E or D9D tractor, is cushioned by four rubber springs, each with 16 rubber discs.

Trunnions of the tandem pusher C-frame bolt directly to the track roller frame behind the bulldozer trunnions. The assembly is supported at the rear by the tractor drawbar. Advantage of the pusher C-frame is that it transmits pushing force from a second tractor through the track roller frame to the dozer push arms.

FACEPIECE—"Clearvue," a facepiece designed by Mine Safety Appliances Co., Pittsburgh 19, for use with its air line respirators, has received approval from the U.S. Bureau of Mines. The facepiece is a monocular type, developed by MSA in 1959, for application to almost the entire line of the firm's breathing apparatus. Advantages are increased visibility, anti-fogging protection and improved speaking diaphragm,

(Continued on p 142)

This crawler-mounted REICHdrill is the largest drill of its type ever constructed. Hole size: 12-16 inches in hard rock. Down pressure: to 90,000 lbs.

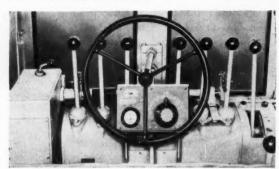


Equipment Developments (Continued)



New Motor Wagon

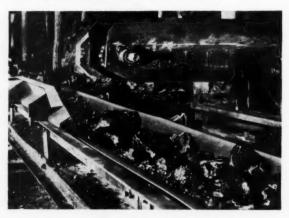
A new all-hydraulic rear-dump motor wagon, the TR-160, made by Allis-Chalmers Mfg. Co., Milwaukee 1, has carrying capacity of 12 tons, 7.7 cu yd struck and 12 cu yd heaped. A six-cylinder supercharged diesel engine rated 155 hp at 2,200 rpm powers the new unit, which weighs in at 28,100 lb. A fivespeed constant-mesh transmission provides forward speeds from 3 to 25.4 mph and reverse at 3 mph. The TR-160 features Kon-Tork differential which automatically controls the amount of torque delivered to each drive wheel in relation to traction requirements. The wagon body has a loading area of 11 ftx7 ft 10 in. Two double-acting hydraulic jacks provide dumping power to a maximum angle of 52 deg. The unit is highly maneuverable and can make a non-stop 180-deg turn in 22 ft 8 in with a 1/6 turn of the steering wheel, notes the company. Operator comfort and safety are given close attention in the machine's engineering, it is added.



Blade Control

Transistors make their appearance on the earthmoving scene

with the introduction of the "all-transistor" Dial-A-Slope automatic blade-control available on motor graders from Le-Tourneau-Westinghouse Co., Peoria, Ill. Made by Preco, Inc., the automatic control system can increase motor-grader efficiency up to 50%, reports LeTourneau. The operator's work is easier since the automatic control frees him from adjusting both left and right blade-lift levers in order to maintain the proper degree of transverse blade slope. Because blade slope, once selected, is maintained, the operator can concentrate his entire attention on steering and regulating depth of cut. He merely turns on the control, sets the degree of slope on a dial and turns a lever to select the end of the blade he wants to have under automatic control.



Tough Coal Belt

A new-type coal belt with solid edges which will not fray or fan out under toughest abrasion has been announced by Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J. Called "Coalmover," the quiet-running new conveyor belt is said to last longer and provide a higher co-efficient of friction than plastic-covered belts. Exceptional pulley grip permits operation at lower tension without slip, while stretch characteristics ensure a minimum of take-up adjustment, according to the firm. Other advantages claimed for the belt's new construction are superior holding ability with all underground types of fasteners, fire resistance throughout, maximum rip and impact resistance, exceptional flexibility and easy natural training at all temperatures. Like all Manhattan underground conveyor belts. says the company, Coalmover is mildew-proof, moisture resistant and certified with a fire-resistant Bureau of Mines acceptance designation.



SINGLE-UNIT TV—General Electric Co., Communications Products Dept., Mountain View Road, Lynchburg, Va., offers a self-contained transistorized TV

camera for closed-circuit viewing. Top efficiency under extreme vibration and noise conditions is the key feature of the new machine. Mobility, compactness and ability to operate at low light levels are other benefits cited by GE for the cameras, which the company believes, have wide application possibilities in the industrial field.

NEW LOADER—Latest addition to the 100-hp Eimco 103 series of crawler-tractors made by Eimco Corp., Salt Lake City, Utah, is their Model 123 front-end loader. This 24-in gage machine has bucket capacity of 20,000 lb at carry position, and maximum breakout force

with the bucket heeled on the ground, of 25,000 lb, The sand and gravel bucket capacity has an SAE rating of 21/4 cu yd, the rock bucket a 2 cu yd capacity and a 24 yd heaped capacity, With working weight of 29,200 lb, the machine features loader arms, main frame, final drive and center housing of steel cast by Eimco's new "Stress Flow" construction, with no bolts or welds. The firm says this feature puts extra strength and weight into the loader where it's needed. Unidrive transmission and Quadra-Torque provide four speeds in reverse and four in forward, adds the manufacturer.

(Continued on p 144)





50 tons of coal take a 5,000-hour ride on B.F.Goodrich tires

Dally production at the Fiatt, Illinois, mine of the Truax-Traer Coal Co. is 7,300 tons. Coal is hauled to the tipple over roads made of crushed limestone. Loads average 50 tons—yet estimated service on the original tread of the B.F.Goodrich Rock Service tires is 5,000 hours!

New long-wear tire compounds

Now Rock Service tires are available in 2 new B.F.Goodrich compounds that tests show outperform any others on the market. Yet they cost no more than conventionally made tires. Cut Protected compound gives longer service where:

Cutting and chipping are severe.

- · Round-trip hauls are short.
- Trucks travel at low speeds. Heat Resistant compound defies dangerous heat build-up where:
 - · Haul roads are well maintained.
 - · Trucks travel at high speeds.
 - · Cutting is negligible.

Intensive B.F.Goodrich research and testing went into the development of these compounds. Only B.F.Goodrich makes Cut Protected, Heat Resistant and Regular compound tires that are actually tailor-made for your type of work. Your B.F.Goodrich Smileage dealer will recommend the best one for you. He's listed under Tires in the Yellow Pages. The B.F.Goodrich Company, Akron 18, O.

Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment.





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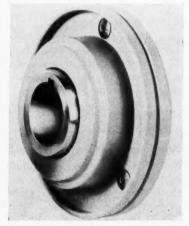
This device is a simple hydraulic ram in which oil pressure powers a hardened-steel cutting blade. The forward edge of the tool is shaped like a hook, permitting the operator to pry a cable away from flat surfaces and other cables. The blade cuts a smooth clean edge. Then two

cuts a smooth clean edge. Then two crimping dies are inserted in place of the blade and pressure is applied, resulting in a tight compact coupling, declares

the company.



MORE MOTORS—An expanded motor line is announced by Lincoln Electric Co., Cleveland 17. The firm's phase squirrel-cage induction motor is the subject of the announcement, with sizes now running from ½ to 125 hp. "Multiguard" protection, a special thermosetting plastic to encapsulate and impregnate the stator, is featured on all motor sizes. Other modifications to improve performance include double-shielded "Super Conrad" bearings, and positive housing seal preventing entry of destructive contaminants.



COUPLINGS—Three features have been added to MC geared flexible motor couplings produced by Link-Belt Co.,

Pittsburg, Kansas

Wellston, Ohio



*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7

Here's one overhead that runs up big profits

This Acme-Hamilton 48-in. conveyor belt, on a Goodman Rope-belt Conveyor is carrying coal at 1500 tph with low maintenance costs and long service life. Note how nicely the belt troughs under the bulky load—and how flat it runs between the return idlers...sure signs of excellent construction and fine quality.

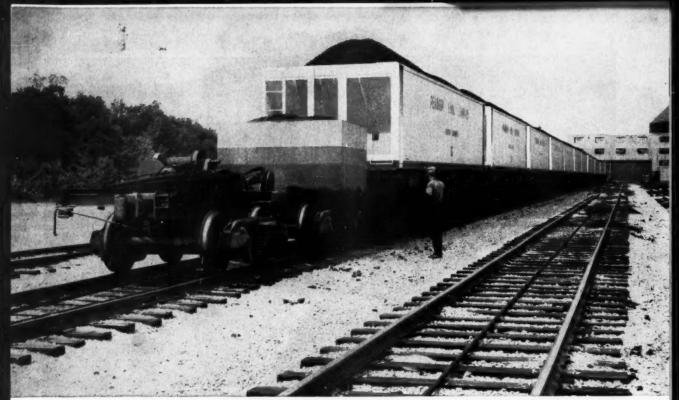
PYROPRENE PROTECTED against fire, Acme-Hamilton U.S.B.M. accepted belts will not feed or spread fire. The cover is fire-resistant Pyroprene; fabric plies and breaker fabric are encased with Pyroprene compound before the belt is built. Cover has exceptional resistance to abrasion and cutting. Write Acme-Hamilton Dept. CA-91.



MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions - Acme Rubber Mfa Co . Hamilton Rubber Mfa Corr

ATLANTA - CHICAGO - DETROIT - HOUSTON - INDIANAPOLIS - LOS ANGELES MILWAUKEE - NEW YORK - PITTSBURGH - SALT LAKE CITY - SAN FRANCISCO - SEATTLE



Car haulage system at River Queen Mine handles 15 cars of coal.

1,875 tons moved with one (USS) Tiger Brand Wire Rope



This automatic car moving equipment at the Peabody Coal Company River Queen Mine in Western Kentucky near Central City is rigged with 8,246 feet of 13/4-inch diameter USS Tiger Brand Wire Rope. It hauls 15 cars per trip with a total weight of 1,875 tons and could handle even greater loads. The system operates four 15-car trips per shift, two shifts per day.

The transmission rope in this service takes quite a beating. Starting loads get heavier as each car is filled. Bending stresses are high and the rope is, at times, subjected to severe abrasion. To meet these conditions, they use a strong, tough Monitor steel rope. Construction is 6 x 37, Excellay Preformed with fiber core.

Why USS Tiger Brand is your best buy. Tiger Brand Wire Rope is designed by one of the country's most capable staffs of wire rope engineers. It is made by a company that maintains the most complete research and manufacturing facilities in the steel industry. When you buy Tiger Brand you get the right rope for the job. And your job is only a phone call away from experienced American Steel & Wire field service representatives.

For more information, write American Steel & Wire, 614 Superior Avenue, N.W., Cleveland 13, Ohio, or contact your nearest Tiger Brand Wire Rope distributor.

USS and Tiger Brand are registered trademarks

American Steel & Wire **Division of United States Steel**



Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors United States Steel Export Company, Distributors Abroad Drive unit rigged with 13/4" diameter Tiger Brand Wire Rope designed for strength, flexibility and long wear.



Equipment News (Continued)

Chicago 1. These additions are: a new corrosive duty cover of polypropylene for operating conditions subject to chemical attack; larger-size couplings, extending the range of the line to 2½-in bore; and new spacer adapter functioning as a demountable rigid extension of the motorshaft.



SPRAYWELDER-A lightweight compact Spraywelder unit featuring high spray rate and exceptional deposit efficiency has been announced by Wall Colmonoy Corp., 19345 John R. St., Detroit 3. Trigger and powder flow control are combined into one positiveacting operating valve, reducing space requirements and permitting compact design. The pistol is 20% lighter than the predecessor, Model C-2, says the firm, which reports deposit efficiency up to 95% and spray rate of over 12 lb per hr. The tool was developed expressly for use with the firm's Sprayweld process, but it is equally applicable to spraying any metal in powder form.



GAS DETECTION-An ultra-sensitive instrument for detecting methane and other hydrocarbon gases in concentrations as low as parts-per-billion has been announced by Carad Corp., Redwood City, Cal. Called Fiad (flame ionization analyzer and detector), the device may be used in mining operations as a sensitive detector of explosive or poisonous gases. In conjunction with gas chromatographic techniques it can accurately resolve methane and other hydrocarbon compounds. The unit is portable and powered by self-contained batteries with minimum life of 1,000 hr, It weighs only 51/4 lb, including batteries, and measures 6x73/4x71/4 in. Using the principle of flame ionization,



Takes the Crushing Problem DOWN TO SIZE!

YOU BENEFIT ...

By Control of Top Size — Crushing to size in one operation eliminates recirculating load . . . saves time and equipment . . . increases overall plant capacity.

By Less Fines — More saleable coal in stoker sizes means more dollars per ton . . . if crushing prior to washing, fewer fines means lower washing costs.

By Flexibility . . . Can handle larger lumps and frozen coal . . . hand wheel adjustment allows you to fill any order down to ¾" top size . . . orders heretofore uneconomical to fill are now yours.

By Dependability . . . Ever-increasing list of satisfied users.

By Economical Operation . . . Less maintenance...Less H.P. per ton of crushed coal... One Crusher . . . Lower initial investment . . . No wasted labor in adjusting crusher.

YOUR CUSTOMER BENEFITS...

By Control of Top Size . . . Less unburnt coal in ashes . . . More BTU output per ton . . . Lower ash handling costs . . . Greater overall utilization.

By Less Fines . . . Simplifies unloading . . . increases boiler efficiency.



T. J. GUNDLACH Machine Co.

P. O. BOX 263 . BELLEVILLE, ILL.

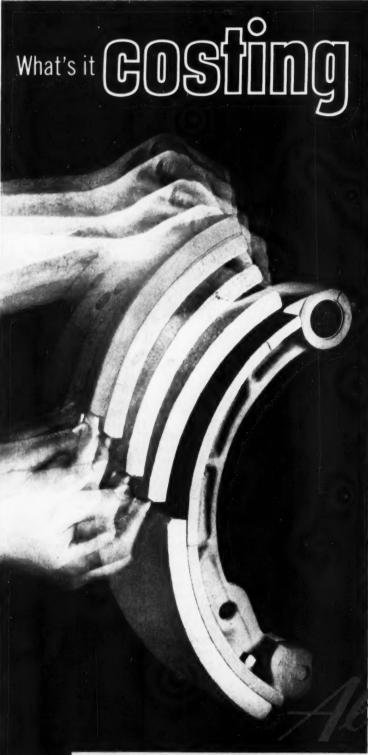
Uniformity in size consist of GUNDLACH crushed coal eliminates customer complaints, gives customer satisfaction, and increases production.

If you have a crushing problem, you'll find a GUNDLACH representative as near as your telephone.

OUR REPRESENTATIVES AT YOUR SERVICE

ANDREW M. GARDNER, 626 Park Lane, Greensburg, Pa., TEmple 4-4346 • MARSHALL EQUIPMENT CO., P. O. Box 1367, Huntington 15, W. Virginia, JA 3-8691 . CLYDE E. CLARKSON, 4831 E. Harvord Lane, Denver, Colo., SK 6-5277 . J. SCHONTHAL & ASSOC., INC., Suite 309, 224 S. Michigan Ave., Chicage 4, Ill., WA 2-8350 . A. R. AMOS COMPANY, 713 Commercial Trust Bldg., Philadelphia, Pa., RI 6-3675 . RICHARD M. WIL-SON, 27 Oak Park, Wheeling, W. Virginia, Woodsdale 586.

Division of J. M. J. Industries



to reline brakes?

Want to save the \$1,000 or more brake jobs can cost you in a year? TORQMATIC DRIVE owners will tell you it's automatic with the built-in retarder, which also provides the added safety of another braking system.

For this optional TOROMATIC DRIVE feature saves service brakes for everything but full stops. Naturally linings last far longer...downgrade runs are safer.

TOROMATIC owners also report saving up to \$2,000 every time they train a new driver ... eliminating one engine overhaul out of three ... wiping out engine-disconnect clutch costs.

Pays for itself in savings alone

Sure you'll pay more for TOROMATIC—but you quickly get your money back in repair savings. And TOROMATIC also speeds job cycles—there's no need to slow down for shifts.

More and more operators are ridding themselves of their clashboxcaused expenses by switching to TORQMATIC. It's been proved on years of tough jobs. Details? See your dealer or write Allison.

ALLISON DIVISION OF GENERAL MOTORS
Indianapolis 6, Indiana
In Canada: GENERAL MOTORS DIESEL LTD.,
London, Ontario

lison TORMAT

TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

Equipment News (Continued)

Fiad measures electron concentrations formed when a hydrocarbon is introduced into a pure hydrogen flame, responding on a carbon atom basis. This method, says the firm, has advantages of higher sensitivity and greater freedom from interference than is characteristic of other methods as mass spectometry, infrared, hot wire combustion and thermal conductivity.



IMPROVED LOADER-According to Frank G. Hough Co., Libertyville, Ill., Series B models of the H-70 and H-90 "Payloader" tractor-shovels offer numerous improvements which better performance for these four-wheel-drive units. While operating capacity of the H-90 remains at 9,000 lb, the peak lift is increased to 18,000 lb. This model has a longer wheelbase and wider tread, providing better balance and greater stability. A new Cummins diesel engine developing 162 hp at 2,100 rpm provides additional power. Major improvements in the full power-shift transmission and torque-converter give superior throttle response and better operating characteristics, says Hough. The H-70 retains operating capacity of 7,000 lb but peak lift is up to 13,000 lb. Improvements in the boom-arm design and bucket-control linkage provide additional digging power, adds the company.

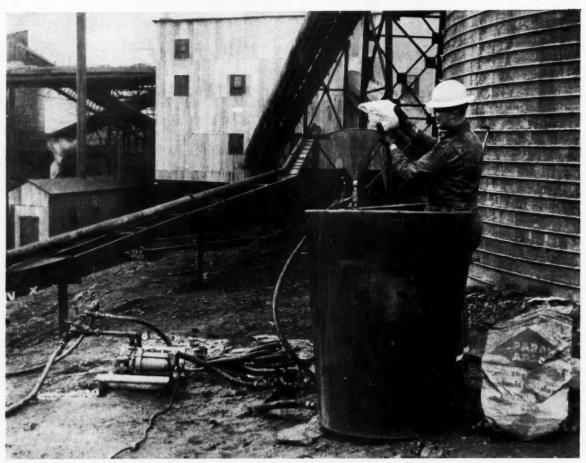


PILLOW BLOCK – Bronze precision liners can be replaced quickly and easily in pillow blocks of a new design announced by Dodge Mfg. Corp., Mishawaka, Ind. The new sleeve bearings are recommended for applications where shock loads, high temperatures and corrosive conditions are anticipated. For the first time, says Dodge, it is possible to replace a worn bushing or liner without removing the bottom half of the housing from its support. Only the cap of the block is removed. The shaft is



YOU CAN'T FIND A

SEPARAN AP30



A proportioning pump assembly used to demonstrate the use of Separan AP30 at the preparation plant.

Separan AP30 Clears Wash Water Where Older Coagulants Failed

Recently, a Kentucky coal company found that Separan AP30 successfully cleared wash water without expensive additions of settling equipment.

Wash water from the launder contained about seven per cent solids. Flow rate of the feed to the 135-foot Dorr thickener was 1600 gpm.

By allowing solids to settle over the weekend, a clearwater depth of about 28 inches could be attained. However, a clear-water overflow could not be maintained past mid-morning on Monday, the first day of the workweek, even by using 50 pounds of starch per day. Tests showed that both clay and coal fines could be settled out with only 1.9 pounds of Separan AP30 per hour. A 0.05 per cent solution of Separan AP30 was fed to the effluent through a grid spray positioned at the centerwell end of the launder. As a result of this treatment, clear water in the thickener was maintained at an average of 42 inches.

Find out how Separan AP30 can reduce the cost of your coal washing operations. Dowell will arrange—without obligation—a demonstration at your plant. Just contact the Dowell District office at 1918 Highway 41, North, Evansville 7, Indiana. The telephone number is HArrison 5-1353.

Services to the coal industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Equipment News (Continued)

lifted enough to permit the lower half of the liner to be loosened and slipped out. A new bronze liner can then be inserted and seated by tapping lightly. The cap liner can also be replaced very easily, adds the firm.



MAGNETIC INSPECTION-Magnaflux Corp., subsidiary of General Mills, Chicago 31, offers magnetic particle inspection materials in pressurized spray cans and plastic squeeze-bottles. No. 14M Fluorescent Magnaglo Bath and No. 9BM Magnaflux Bath are offered in 12-oz pressure cans and can be used with any of the magnetic particle inspection equipment or test kits now used in industry. No. 1 Gray Powder is available in plastic bottles. The firm notes that these three basic low-cost test materials have been the most widely used in the earlier forms and are identical in controlled quality, sensitivity and high visibility to supply continued full-reliability inspection for cracks and defects.



HARDSURFACING—Automatic Welding Co., Waukesha, Wis., has designed a special unit for handling hard-surfacing on rollers, idlers and wheels up to 40 in in diameter. Called "Micro-Matic," Model 7520-Y, the machine is equipped with a new "Full Yoke," permitting mounting of all types of rollers, includ-



THE WILD N-III HIGH PRECISION LEVEL is

universally accepted as the standard wherever absolute accuracy, dependability and ruggedness are paramount considerations. The N-III is easy and quick to set up and operate.

Three models are available to meet both field and industrial requirements, reading direct to .1 mm; .001 inch; .0005 ft.

All have tilting screw, coincidence level and built-in optical micrometer

Write for Booklet N-III.



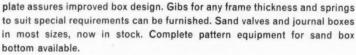


LOCOMOTIVE FRAME PARTS

JOURNAL BOXES and SAND VALVES

Now Available

Offering a complete line of locomotive frame parts that feature journal boxes, sand valves, springs, plates and gibs. Manufactured of durable materials that fit accurately yet effect attractive price savings. Simple, adjustable bronze thrust



We carry a large stock of brake shoes for any type locomotive.

Prompt Delivery from Stock

Flood City

JOHNSTOWN, PA.

BRASS & ELECTRIC COMPANY

THIS MINE SUPERINTENDENT KNOWS



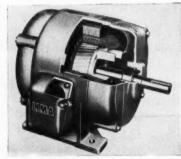
We found the price of the Kennametal bits somewhat high, but we receive twice as much service. We have found their bits to be the best value on the market. It gives longer service, less dust . . . and will stand sulphur, as we've found out.

KENNAMETAL Inc.

MINING TOOL DIVISION
Bedford, Pennsylvania

Equipment News (Continued)

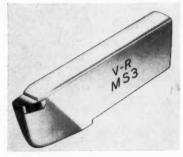
ing large integral shaft rollers such as used on Euclid and other heavy equipment. It provides automatically and with great precision a new surface often superior to the original, according to the manufacturer. Features include variable-speed travel carriage, motorized weldinghead lift, master-control console and easy positioning.



RERATED MOTORS—Redesigned to meet new NEMA specifications, Type RS dripproof motors, from Lima Electric Motor Co., Div. of Consolidated Diesel Electric Corp., Lima, Ohio, feature fully-seast feet to assure the highest degree of rigidity in mounting without stator dis-

tortion. Motors are available in ratings from 1 to 150 hp, frame sizes 182 to 505. Other features include solid die cast rotors with dual integrally-cast cooling fans, dynamically-balanced rotor assembly and mylar insulation for high dielectric strength.

AC MOTORS-A new kind of motor overload protection called Thermo-Tector is available on all Tri-Clad 55 threephase induction motors up to 125 hp, from General Electric Co., Schenectady 5, N.Y. The protection is provided by two or more miniature heat-sensing switches buried in the stator windings. The switches, connected in series with conventional motor control, shut the motor off whenever internal winding temperature exceeds a predetermined amount regardless of rate of temperature rise. Under rapid rise the Thermo-Tector switches "anticipate" and open the circuit at a lower temperature than when the rate of rise is slow. Advantages include: avoiding burnouts from overload; matching drive motor more closely for load since there is no need for higher power rating as a safety margin; and eliminating expensive control devices, relays or amplifying circuits.



NEW BIT—A new-style chain-cutter bit, produced by Vascoloy-Ramet Corp., 800 Market St., Waukegan, Ill., features a chisel-type tip, cutting down fines and providing fast smooth cutting without drag, according to the company. For cutting machines and universal-type miners, the new bit, Style MS3, has a lip design that holds the carbide tip securely, yet does not deter the fast cutting action, V-R adds.



AC DRIVES—"Magnaflow" is a new classification of adjustable-speed AC drives introduced by Westinghouse Electric Corp., Box 2099, Pittsburgh 30. These drives, of integral-unit construction, are



buy BOSTON belts

The Right Belt . . . The Best Belt . . . For Every Mining Job

BOSTON ULTREX* - The new PVC belt with a tough carrying surface and superior impact and flame resistance. Smooth edges stubbornly resist edgewear. By actual test, this more compact specially-designed, single-ply carcass has best fastener-holding ability.

BOSTON FLAMEOUT 200* - Single-ply, flame resistant belt with maximum impact resistance, outstanding edge wear, and fastener holding strength. Has neoprene covers. No slipping on pulley. Improved wear-resistant cover available in any thickness. Ideal for panel and continuous miner installations.

BOSTON COLLIERY KING - Balanced Belt Construction with Dulon covers for longest service life in preparation plants and all above-ground coal handling.

BOSTON SUPER BOSTRON - Balanced Belt Construction, with Dulon or Flameout covers for severe impact and high tension belts. Ideal construction for longest service life on slope conveyors. Strong, thin carcass allows smallest diameter rolls for low coal removal. Carcass will not rot or mildew.

BOSTON FLAMEOUT* - Balanced Belt Construction for permanent underground installations and main entries having special tension requirements.

*Fire-resistant — maximum underground safety. Meets standards of U. S. Bureau of Mines Acceptance Designation No. 28-9.

Whatever your requirement, BOSTON has the right belt for the job - assuring you longer belt life . . . less trouble in service . . . greater economy!



BOSTON WOVEN HOSE & RUBBER DIVISION BOSTON 3. MASSACHUSETTS

















When results are compared, Austin Apcomite proves to be more economical to use than on-the-job ammonium nitrate mixes. Besides producing greater explosive power per foot of loaded blast hole, it combines the low initial cost features of processed ammonium nitrates with the handling ease and controlled shooting of regular explosives.

Field tested for 3 years, Apcomite is ready for loading in vertical or horizontal holes—ready to shoot. Each tube has a primer in its nose . . . requires no special priming. Because it is always manufactured under the same uniform conditions, Apcomite can be used for controlled shooting not possible with on-the-job ammonium nitrate mixes.

2 TYPES MEET ALL CONDITIONS

Apcomite 17 and Apcomite 20A incorporate specially-processed ammonium nitrate packaged in 23G tubes of 5" and larger diameters. While they are basically the same, No. 17 is for all-normal usage while No. 20A, with its greater density, is for wet holes.

Austin also produces Austinite 15, a controlled ammonium nitrate mixture furnished in polyethylene-lined burlap bags. Likewise available in bulk bags of 50, 80 and 100 lbs.

7 REASONS FOR USING APCOMITE

- low final cost provided by greater explosive power per foot of loaded blast hole
- convenience . . . eliminates most shipping, storage, mixing and materials handling problems
- · no special priming needed . . . primer in nose
- packaged in 23G tubes that are easy to handle and load
- · uniformly manufactured . . . no chance of improper mixing
- · permits controlled shooting
- adaptable to vertical or horizontal holes

For complete details on how Apcomite can improve your operations, call your Austin representative today.



AUSTIN

POWDER COMPANY

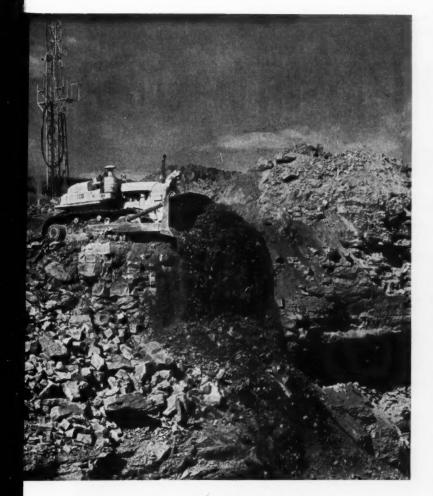
Equipment News (Continued)

rated from ¼ to 100 hp. Larger drives with separate motor mounted on a bedplate are offered up to 700 hp, liquid cooled. Simple control modifications to provide a variety of speed-operating functions are available. The company emphasizes that once the drive is set before or during operation speed remains adjusted. A built-in tachometer monitors and automatically corrects timing regardless of any load change. There are no brushes, commutators or slip rings to maintain and no friction members to replace or adjust.



GAS ENGINES-Allis-Chalmers Mfg. Co., Milwaukee, Wis., has expanded its line of gasoline and natural gas engines, adding the G-138, a new 4-cycle 138 cu in piston-displacement unit developing 39 bhp at 1,800 rpm. G-138 is 46 in long, 185/16 in wide and 301/2 in high to top of the radiator. These dimensions, reports A-C, make the engine ideally suited for operations where up to 39 hp is required. It weighs 402 lb, the power unit 622 lb. Important design inclusions are full-pressure lubrication, replaceable wet-type cylinder sleeves of fine grain alloy iron for long wear and low cost replacement, and one-piece alloyed ironribbed cylinder block providing maximum rigidity and permanent alignment of bearings.

NEW CORD-A new Type SO portable cord designed to give users at least three times more service than other cords of this type, has been announced by General Electric's Wire & Cable Dept., Bridgeport, Conn. The new cord is called TenX, and features a conductor of special copper alloy. The individual strands of the conductor average 20% finer than those of similar cords and are rope stranded. Other construction features include a lead-cured neoprene jacket reinforced with a basketweave braid for added jacket strength. color-coded rubber insulation, and highstrength cotton fillers for additional tensile strength. This combination of fea-



"CLASH-BOX" robbing your CASH-BOX?

Crawlers without full-power shift are obsolete . . . and costly!

If your crawlers have master clutches and manual shift transmissions—"clash-boxes" as they're commonly called—you may be passing up profits that should be yours.

With proven Torqmatic Drive in the Model C-6 and the TC-12, Euclid Crawlers provide full-power shift and instant reverse. There's no loss of power or momentum when changing from one speed range to another... no delay for clutching and shifting... and with a flick of the wrist you change travel direction fast. It's a dependable power train, too... proved in thousands of "Euc" earthmovers on every kind of job.

Have your dealer show you how Euclid Crawlers have more productive capacity on any tractor work...dozing, ripping, push loading big scrapers, or towing heavy loads. The seconds they save on every work cycle can add up to more cash in your cash box!

EUCLID Division of General Motors, Cleveland 17, Ohio Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland.



Proven Torqmatic Drive provides smooth steady flow of power ...full-power shift... instant reverse... easy operation. For push loading scrapers the fast maneuverability of "Euc" crawlers cuts scraper cycle time and steps up production... changes from one speed range to another, and from forward to reverse and back again, are made under full power... there's no clutching.



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

GET REAL PRODUCTIVITY-GET A GM DIESEL



Get an engine that stays on the job making money-and you'll get more work done, a bigger return on your investment, bigger profits in your books.

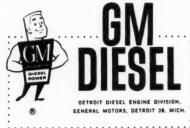
That goes for auxiliaries as well as main propulsion engines-and it's the reason Pittsburgh's Consolidation Coal Company uses GM Diesel generator sets on their towboats.

One "Jimmy" on their M/V Mathies has run better than 30,000 hours without overhaul-another has logged more than 29,000 hours and is still going strong. GM Diesels on the M/V Arkwright have 28,000 hours without overhaul-on the

M/V R. L. Ireland, 27,000 hours with only minor attention. And the GM "6-71's" on the M/V Humphrey have 6,000 hours without a dime for repairs.

These auxiliaries provide power for lights, radar, ship-to-shore telephone, steering motors, capstan motors, compressors and various other motors. Their remarkable service record is one reason why Consolidation uses "Jimmys" in a tender, hoist boat, and marine ways hoist, too.

You'll get more productivity and profits with GM Diesel. If you need from 20 to 1650 h.p., you can get it from the GM Diesel All-Purpose Power Line. See your GM Diesel distributor - he's in the Yellow Pages under "Engines, Diesel"or write direct for more information.



In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario Parts and Service Worldwide

GM DIESEL ALL-PURPOSE POWER LINE sets the standard of Diesel productivity

Equipment News (Continued)

tures results in a cord that is extremely flexible and which, in both laboratory and actual in use bending and twisting tests, has lasted five times longer than the best cords of similar types, reports the firm. TenX is available in size 18 through 10 Awg, in two, three, and four conductors. It is rated 600V.

PUMPS-New hydraulic gear pumps with simple design for long life and top performance have been announced by Borg-Warner Corp.'s Wooster Div., Wooster, Ohio. Operating on a pressure-loading principle, the pumps' design permits pressure from the outlet port to be diverted behind the rear bearings to reduce clearance between bearing faces and gears for optimum volumetric efficiency at all speeds and pressures, says the firm. Contributing to longer life and higher ratings are special-alloy tin-aluminum bearings of the type used in the heaviest-duty industrial engines, double-lip shaft seal, hardened- and ground-steel gears and shafts and high-tensile aluminum bodies.

NEW DIESEL FUEL—Fuel tailor-made for diesel engines will improve performance and reduce maintenance problems, declares Standard Oil Co. (Indiana), which has introduced the fuel for the first time. Standard's new fuel, Premier,

replaces Stanolind and Stanolex diesel fuels. Premier cuts wear of injectors, burns better and gives maximum power and mileage with minimum engine deposits, smoke and odor, notes the company. It will be colored red to distinguish it from distillate heating oil often used for diesel engines, and will be handled separately from other products to ensure its high quality and use only as a diesel fuel, it is reported. "Diesel truckers will benefit particularly because the quality of the fuel will be uniform wherever they fill up. There won't be any difference in performance or specifications as sometimes happened before," a company spokesman said.

Free Bulletins

Classifiers—Mine & Smelter Supply Co., Denver, Colo. Catalog No. 201, 28 pp, discusses Akins spiral classifiers and heavy-media separators. Booklet includes complete operating information, construction, capacities and drawings for plant layouts.

Electric Plants—D. W. Onan & Sons, Inc., Minneapolis 14, Minn. "Standby Electric Plants and Controls." Guide, with practical suggestions for emergency electric power setups, evaluates specific installations and discusses errors to avoid. Pulleys—Stearns Magnetic Products, 635 S. 28th St., Milwaukee 46. New booklet discusses complete line of Indox V permanent-magnet pulleys, including range of sizes from 12 to 48 in.

Construction — Allis-Chalmer's Construction Machinery Div., Milwaukee. Four booklets are available; MS-1357 treats the Ts-360 motor scraper, recently introduced; UT-116 discusses D-10 and D-12 utility tractors; MS-1319 covers the Model D motor grader with illustrations; MS-1322 handles highlights of TS-160 motor scraper,

Handling Bulk—Link-Belt Co., Chicago 1, Ill. No. 2721, 6-p folder, describes three types of Jetslingers, machines equipped with short high speed belt conveyors for hurling free flowing bulk materials into inaccessible areas.

Slushers—Joy Mfg. Co., Pittsburgh 22. Two new bulletins cover line of lightweight air- and electric-driven slushers. Bulletin 76-F handles No. S-211 and Bulletin 76-G discusses Model FF-211.

Welding—International Harvester Co., 180 N. Michigan Ave., Chicago 1. Fourpage folder describes TD-15-5001 Paywelder, a mobile welding unit with two 325-amp dual welders and four leads.

Rippers-Caterpillar Tractor Co., Pe-



For dust-free haulage roads-

SOLVAY CALCIUM CHLORIDE

It pays to end dust on haulage roads with Solvay® Calcium Chloride, for five good reasons,

(1) Visibility is improved ... roads are safer. (2) Compacting the road surface makes it strong enough for heavy loads, yet little maintenance is needed. (3) Equipment keeps in better mechanical shape. (4) Worker morale is improved ... no dust hazard. (5) No dust complaints from nearby residential areas either!

WRITE FOR "END DUST." Booklet tells how your men can easily and economically compact roads using SOLVAY Calcium Chloride.



SOLVAY PROCESS DIVISION

61 Broadway, New York 6, N. Y.

SOLVAY branch offices and dealers are located in major centers from coast to coast.

HiGH production



Uniform product size with minimum fines is achieved by a non-fluctuating opening between the rolls during crushing. Low in cost and extremely sturdy, the popular Black Diamond Roll is effective in reducing coal, coke, cinders, lime and similar materials. Features: Rapid roll-setting adjustment, effective tramp iron protection, wide range of sizes and roll types. Write for Bulletin.



BLACK DIAMOND DOUBLE ROLL CRUSHER

McLANAHAN & STONE CORPORATION

250 Wall Street • Hollidaysburg, Pennsylvania

Equipment News (Continued)

oria, Ill.-How ripping can increase earthmoving profits is described in new 8-p brochure released by Caterpillar. Construction details and operation of rear-mounted rippers for Caterpillar D9, D8, D6 and D4 tractors are included.

Materials Handling-Fuller Co., Catasauqua, Pa.-Selection of right control panel for wide variety of automatic materials-handling systems is subject of new 12-p illustrated bulletin.

Motors-Allis-Chalmers Mfg. Co., Milwaukee 1. Synchronous motors which help maintain efficiency at fractional or full loads, correct power factor, increase system output and improve plant voltage regulation are described in Bulletin 05B9522.

Belt-Boston Woven Hose & Rubber Co., Div., American Biltrite Rubber Co., Inc., Cambridge, Mass. Industrial V-belt design catalog, 64 pp, features pre-engineered data for "BostRon" V belts. Included are selection tables, horsepower rating tables and matching data.

Ripper-Greenville Steel Car Co., Earthmoving Equipment Div., Greenville, Pa. Bulletin GR25-160 describes "Brute," a new heavier ripper for use with International TD-25 crawler tractors.

Bits-Joy Mfg. Co., Pittsburgh 22. A 4-p bulletin discusses tungsten carbide rock bits. Bottom-drive, shoulder-drive and taper-socket bits are illustrated and explained.

Coils-General Electric Co., Schenectady 5, N. Y. Information and data on GE's Type MD replacement coils, made to original equipment size and electrical design are contained in new Booklet GEA-7014.

Lubricant-The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn. New book describes wide industrial application of Molykote Type G, a grease consistency lubrication. Discusses how Molykote G reduces galling, seizing and metal pickup in high-pressure and high-temperature applications.

Drilling-Acker Drill Co., Inc., Scranton, Pa.-Bulletin 10 tells about complete line of diamond bits, core barrels, rotary rock bits and drag-type bits. Includes 50 illustrations.

Pin Press-Owatonna Tool Co., Cedar St., Owatonna, Minn. A new OTC trackpin press which quickly removes and installs rack pins and bushings on small crawler-type tractors is fully discussed and illustrated in new Bulletin TP-9.

Among the Manufacturers

Robert E. Kinter replaces the retiring Roy E. Campbell as director of adver-



Kinter

tising and sales promotion at Joy Mfg. Co., Pittsburgh. Mr. Campbell has been with Joy for 31 yr. Mr. Kinter, former assistant director, will now be responsible for administration of services to the

company's Coal Machinery, Mining & Construction, and Industrial divisions. His work will also include providing staff advice to the advertising departments of the Baash-Ross, Electrical Products and Western Precipitation divisions. He is a native of Homer City, Pa., and a graduate of Pennsylvania State University with a B. A. in journalism.

Spencer Chemical Co. has named William B. Macomber and Charles M. Cooley to supervise sales and technical service activities for its N-LV ammonium nitrate. Appointment of the two men follows a streamlining and expansion of the firm's sales program for ammonium



Macomber

96

Cooley

nitrate for field-compounded blasting agents. Mr. Macomber will have the post of sales supervisor and Mr. Cooley will be manager of technical service.

R. R. Schubert has been elected vice president, National Mine Service Co.,



Schubert tives and related mining equipment. National Mine Serv-

Pittsburgh. His headquarters will be the Greensburg, Pa., division, where he will continue his responsibility as general manager. The division makes mine and industrial locomotives and related

ice also announced it has established an Alabama division with warehouse and sales headquarters in Birmingham. P. L. Hubbert, district manager of the western Kentucky division, will be in charge of the new division's distributor products section, assisted by C. R. Bucklin, sales representative. J. J. Ward, sales engineer, will work the territory for the equipment section.



T. J. J.



Page

Heyl & Patterson, Inc., Pittsburgh, has made corporate changes aimed at strengthening its management team. H. R. Edelman III was elected executive vice president. Mr. Edelman has been vice president in charge of production, in which position he has gained a broad knowledge of all phases of operation. J. F. Page has been elected vice president-assistant to the president and treasurer, Charles F. McKenna, of the legal firm of Strassburger & McKenna, was elected secretary.



I Ordered Kelly Repair Parts.

KELLY MANUFACTURING CO.

STEEL FABRICATING DIVISION

MIDDLEPORT, OHIO



MACHINE PARTS DIVISION

CHARLESTON 21, W. VA.

"It will pay you to take a close look at . . . this new"

REVERSIBLE RATCHET BIT WRENCH





Speeds Bit Changing On All Continuous Miners And Cutting Machines

• Fits all machines using %" set screws.

· Reverses direction of stroke in an instant.

Loosens or tightens set screws without removal.
Forged steel handle . . . wrench withstands over

• Saves up to ½ hr. per shift in changing time.

There's no other wrench like it for quick change jobs. Fits into openings where side clearance is only $\frac{1}{2}$ "... solid, one piece handle is 18%" long. Solid box-end is ideal for "sledge-hammer" jobs where set screws are irretrievably "frozen."

Mfgr's of Parts For Mining Machinery

Mine Car Wheels Rebuilt To Better Than New

Write for illustrated literature and prices — FREE

NORTH AMERICAN GEAR CO., 39 E. Campbell St., Blairsville, Pa

Manufacturers (Continued)





Lee

Kelly

Joy Mfg. Co. has named Arnott J. Lee manager of portable compressor products. Mayo C. Kelley has been appointed to fill the post vacated by Mr. Lee, district sales manager for the Mining & Construction Div., Chicago-St, Louis territory. Mr. Lee will locate at Joy's Michigan City, Ind., plant. Mr. Kelley's responsibilities will include sales and service of Joy rock-drilling and air equipment for construction and mining industries, and construction equipment distributor liaison in Indiana, Illinois, Iowa, Missouri, Arkansas, Kansas and the eastern parts of Nebraska and South Dakota.

Jesse W. Stacy has been appointed mining sales and service engineer for



Stacy

the Carmet Div., Allegheny Ludlum Steel Corp. will handle He selling and servicing of Carmet mining tools in West Virginia and Virginia. Mr. Stacy comes to Allegheny Ludlum from Iov

Mfg. Co., where he had been a service engineer for 3 yr. Allegheny Ludlum also announced that The Mine Equipment & Supply Co., Madisonville, Ky. has been named a Carmet mining tool distributor for the western Kentucky area.

THIS MINE FOREMAN KNOWS

THE DIFFERENCE SHOWS UP IN PERFORMANCE

The bits are made of the finest quality steel, and we've found that they will cut through coal where others will not. They're a big improvement over any other type we've ever used.

KENNAMETAL Inc.

MINING TOOL DIVISION Bedford, Pennsylvania Josepha Albiez has been appointed general sales manager, Construction Ma-



Albiez

chinery, of Curtiss-Wright Corp.'s
South Bend, Ind.,
division. Mr. Albiez has been active as product
sales manager and
technical sales
manager since
Curtiss - Wright's
entry into the
construction ma-

chinery neid and has many years of prior experience with a predecessor company. He is a graduate engineer and an active member of the American Society of Civil Engineers.

Simplex Wire & Cable Co., Cambridge, Mass., has named three new



Logan

officers. John W. Logan was elected executive president, Dr. John T. Blake, senior vice president and C. J. Crowdes, vice president. Dr. Blake and Mr. Logan were also elected to the board of directors.

Mr. Logan will direct all operations of the company. He joined Simplex in 1959 as vice president. He was employed by General Electric in 1931 and served in various managerial capacities until 1953. In that year, he became president of Cambridge Corp., Lowell, Mass., remaining there until May, 1959.

Joy Mfg. Co. honored 13 executives who have been with the company from 20 to 35 yr. The men, guests of a special dinner, were presented with service award pins by Joy president, W. L. Wearly. They included: (35 yr.)-Cecil L. Dunham, special representative, New York Export; Walter M. Jones, district manager, Coal Machinery Div., St. Louis; Louis C. Rhodes, district manager, Mining & Construction Div., San Francisco; (30 yr)-Roy E. Campbell, director of advertising and sales promotion, N. Y.; Walter Smith Sr., sales engineer, Industrial Div., Dallas, Tex.; (25 yr)-W. Herman Van Houten, assistant to president, Pittsburgh; Arnott J. Lee, district manager, Mining & Construction Div., Chicago; John Y. Richards Jr., sales manager, Industrial Div., Pittsburgh: (20 yr)-Walter G. Hutz, sales engineer, Boston; Clair C. Ballard, sales engineer, Seattle, Wash., and Thomas G. Weir, district manager, Los Angeles, all of the Industrial Div.

Manufacturers (Continued)

Activities of the Roberts & Schaeter Div. of Thompson-Starrett Co., Inc.,



McCullock

have been separated into two fields, engineering and construction of coal preparation facilities and related material handling equipment fields, centered in Chicago; architectural and engineering work,

in New York and Los Angeles. The Chicago operation, making up the bulk of Roberts & Schaefer volume, will be directed by a management group consisting of: William C. McCulloch, president; R. G. Miller Jr., vice president, sales; J. F. Peyronnin, vice president, operations; and William A. Mullen, vice president and treasurer.

Briefs

Eugene S. Reed named sales manager, Rockbestos Wire & Cable Co., New Haven, Div. of Cerro de Pasco Corp. Richard U. Larson appointed wire rope sales representative, replacing Robert Paustian, LeTourneau-Westinghouse Co., Peoria, Ill. M. E. McCrosson elected vice president, Textile Div., Russell Mfg. Co., Middletown, Conn. H. Wallace Rowles chosen manager of structural and plate products, United States Steel Corp., Pittsburgh.

Thomas B. Applewhite named manager, conveyor products sales, United States Rubber Co., New York. Walter B. Eklund elected vice president, operations, and Charles F. Dexter, vice president, industrial sales, Warren Pumps, Inc., Warren, Mass. Wallace P. Miller named manager, two-way radio sales, Midwestern states, Motorola, Inc., Chicago 51. F. Robert Elsner joined the Sales Dept., Mine & Smelter Supply Co., Denver.

E. E. Helm, president, The Reliance Electric & Engineering Co., named chairman, Industrial Equipment Div., National Electrical Manufacturers Association. Dale F. Romohr appointed district sales manager, Cincinnati region, Dayton Industrial Products Co., Melrose Park, Ill. James T. Eddins named sales representative, Georgia, eastern Tennessee, North and South Carolina, Austin Powder Co., Cleveland 13, C. H. Hollifield named assistant manager, sales, and D. M. Lilly, sales representative, both for Charleston, W. Va., Dist., Independent Explosives Co., Cleveland 14.

Sight Feed Generator Co., West Alexandria, Ohio, makers of welding equip-

ment, acetylene generators and compressing plants, has voted to change its name to Rexarc, Inc. The company will retain the "Sight Feed Generator" name as a division.

Earl M. Pollock has been chosen vice president, Ohmart Corp., manufacturer of gaging and control systems.

Simplex Wire & Cable Co. will spend \$3 million to expand manufacturing facilities 100,000 sq ft at its Cambridge, Mass., plant.

T. B. Wood's Sons Co. has appointed Bearing Service Co., Pittsburgh, distributor of "Life-Lube" bearings and iron goods for the "Tri-State" district of western Pennsylvania, West Virginia and eastern Ohio.

Maurice Hellman has been named district representative, Utah, Colorado and Wyoming, for LeTourneau-Westinghouse Co.

Charles R. Billman was appointed general manager for the National Electric Div., of H. K. Porter Co., Inc.

F. J. Strnad has been named vice president and chief engineer, Link-Belt Speeder Corp., Cedar Rapids, Iowa. He was formerly the firm's chief engineer.

Barber-Greene Co., Aurora, Ill., manufacturer of materials-handling equipment, approved a merger with Smith Engineering Works.

Marshall A. Williams has been named director of marketing, Simplex Wire & Cable Co., Cambridge, Mass.

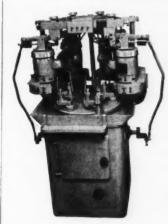
E. J. Rigdon & Co. has been named pointed Pittsburgh distributor for Ruslon PVC coal-mining conveyor belting, made by The Russell Mfg. Co., Middletown, Conn.

Stenberg Mfg. Corp. has announced it will conduct its business under the name, Flygt Corp.

Caterpillar Tractor Co.'s Engine Div. has announced organizational changes in its Sale Dept. Jack H. Gill, former engine sales manager, has been promoted to assist H. H. Howard, vice president in charge of the division. Fred V. Jacobs moves from manager of Caterpillar Tractor Co.'s Sales Dept., to serve as Engine Div. sales manager. Bob Cumming takes over as manager of the Manufacturers' Sales Div. Hugh Rose is manager of Caterpillar Dealer Sales Div.

Cut Bit Grinding Costs!

. . . and get these extra benefits



FREE

- **★** Better Performance
- ★ Uniform Results
- * Maximum Bit Life
- ★ Fast Production

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIR-VIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

A List Of Satisfied Customers Furnished On Request WRITE TODAY for fully descriptive bulletin!

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FAIRVIEW, WEST VIRGINIA

Professional Services

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1—Joy 14BU & 7CE high pedestal loader.
4—Joy 14BU 3PE Loaders.
2—12BU10E Joy Loaders complete with Piggy-Dacks.

2—Joy 12BU Loaders, 9E, latest type.

1—Joy 20BU Loaders, latest type.

4—Joy 11BU Loaders, latest type.

1—Joy 8BU Loaders, 34° overall height.

2—Joy 8BU Loaders, 220 V. AC.

1—Joy curved Bar Head, complete.

6—Reliance 24-J Motors, 70½ H.P.

10—Reliance 38-J Motors, 10 H.P.

20—9-J Motors, 4 H.P.

20—9-J Motors, 4 H.P.

20—Goodman 660 Loaders on Crawlers, excellent 250 V. DC.

1—Goodman 665 Loader on Crawlers, latest Goodman 660 Loader on Crawlers, excellent 250 V. DC.

Goodman 665 Loader on Crawlers, latest type 250 V. DC.

Goodman 865 Loader, 26" hi. Rebuilt. 250 V. DC.

Joy 88C Shuttle Cars, rebuilt.

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—leffrey, 4 ton, type MH-96, 42", 44", 48".
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—G.E., 6 ton, types 801, 803, 821 locomotives, 44", 44" and 48" ga.
—G.E., 8 ton, type 822 locomotive, 44" ga.
—G.E., 10 ton, type 809 locomotives, 42", 44" and 48" ga.
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2—Goodman 724 Slabbers.
2—Goodman 724 Slabbers.
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15—Jeffrey 35B's and 35BB's.
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10—Jeffrey 29C's, track mounted.
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4,000 Conveyor Belt, 36".
4,000 Conveyor Belt, 26".
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-Cummins 125KW Diesel with 250 V. DC 1-Commins JESAW Diesel with 250 V. DC.
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Boilers, like new, 500 H.P.
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3—Jeffrey L-500 Loaders.
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Steel Trestles for drop bottom cars.

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90—Mine Cars, drop bottom, 44" ga.
100—Mine Cars, 18" high, end dump, 44" ga.
300—Mine Cars, 18" high, end dump, 44" ga.
300—Mine Cars, 18" high, end dump, 44" ga.
301—Mine Cars, 18" high, end dump, 44" ga.
301—Mine Cars, 18" high, end dump, 44" ga.
301—Mine Cars, 18" ga.
301—Mine Cars, 18" ga.
301—Mine Cars, 18" ga.
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301—Mine Say, 18" ga.
301—Mine Say, 18" ga.
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10—42E Jey Shuttle Cars.

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4—18U -75E Jey Loaders

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2—20BU-1-3E Jey Loaders

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MISCELLANEOUS TRACKLESS EQUIPMENT
2-MT66AS Jeffrey Shuttle Cars, matched pair,
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50-35B & 35BB Jeffrey, Bugdusters and Trucks
available

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4—300KW M.G. Sets
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5—150KW G. E. Rotary Converters, w Transformers
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2—150KW M.G. Sets
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3-7 Ton Atlas Battery Lecomotives

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6.1HG
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Model 477G
63-Goodman G12/2, G15 and G20 Drives
7-Joy Ladel UNI7 Shaker Drives

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MINE CARS
90-36*1,9 Drop Bottom Cars
155-42* 1.9, End Dump Cars, various makee
260-42* 1.9, S. D. Drop Bottom Mine Cars
45-42* 1.9, ACF Drop Bottom Cars
22-44* 1.9, Drop Bottom Cars, various sizes
333-44* 1.9, End Dumn Cars, various sizes
327-48* 1.9, S. D. Drop Bottom Cars,
259-48* 1.9, S. D. Drop Bottom Cars
2-56*/2* 1.9, 3 Ton, 4 Wheel Push Trucks (NEW)

7

1

5

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400—Tens. 30, 40, 45, 56, 60, 65, 70, 80 & 90 lb. 400—Tens. 30. 40. 45. 56. 60. 65. 70. 80 & 90 lb.
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325'—2.000.000 CM Bare Copper Feeder Cable
550'—1.000.000 CM Insulated Aluminum
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100'—30.000 CM Copper Highline Wire
47.000'—1.0 Solid Copper Highline Wire
47.000'—1.0 Solid Copper Highline Wire
47.000'—1.0 Solid Copper Highline Wire
10.435'—1.2 Solid Copper Highline Wire
10.435'—2.2 Solid Copper Highline Wire
10.435'—2.5 Solid Copper Highline Wire
10.435'—2.5 Teld Copper Highline Wire
10.435'—1.5 Teld Copper Highline Wire
10.45'—2.5 Solid Copper Highline Wire
10.45'—2.5 Solid Copper Highline Wire
10.500'—4.0 Tro ley Wire
1.600'—4.0 Tro ley Wire
1.600'—4.0, 3 Cond. Anhydrex & lead covered transmission cab.e
2.500'—11'—5 See Cable, New
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600'—11'—6 See Cable New

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I—Canton Track Cleaner, Excellent
19—HKL HKG HKD HKC, HL, & CH Brown
Fayro & Sullivan Holsts
1—WK29 Sullivan Air Compressor, 120 cu. ft. Fayro & Sullivan Hoists

I—W K29 Sullivan Hoists

I—W K29 Sullivan Hir Compressor. 120 cu. ft.

I—Cantrell Compressor 120 cu. ft.

I—Cantrell Compressor 120 cu. ft.

B—Air Compressor of various sizes

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 Volts D.C:
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60	Al. Chal. S. B. Drip	DE-131	1200
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40	Contury 8.8. Drip-New	DN-375	1800
30	West E.S. Drip New	SK-93	1800
25		SK-100L	
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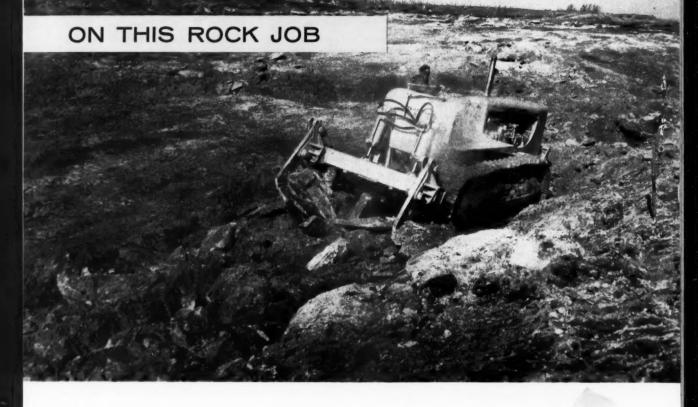
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A FORGOTTEN PHRASE



If there's any yelling it's probably about the savings of ripping the rock rather than drilling and blasting.

This is Lee and Fox's job, U.S. Route 276 in Laurens County, South Carolina. They had to remove 70,000 cu. yd. -a large portion of it rock.

And that's where their D8 and No. 8 Ripper took over. The rock was torn up and shattered into pieces small enough to be loaded out in scrapers. That means big savings.

This one job isn't the whole story by any means. Just take a look at cost savings on different jobs, different materials, all over the country. (See chart at right.)

With the new heavy, powerful Caterpillar track-type Tractors and modern rippers, costs run about 35% to 60% of blasting costs - sometimes even as low as 11%! And there are more savings than that . . . a ripper shatters the material small enough that it can be loaded out with scrapers rather than with a shovel and trucks or wagons.

For a complete story on the economics of ripping see your Caterpillar Dealer. He knows the dollars and cents

The new D8 SERIES H-a modern track-type tractor giant. NEW turbocharged D342 Cat Diesel Engine - 235 HP (flywheel). BIG -47,000 lb. operating weight. New 84" track gauge, new undercarriage. New common lube system for transmission, bevel gear and steering clutches. Power shift transmission optional.

COST RELATIONSHIPS OF TYPICAL JOBS

Location	Material	Ripping Costs (Cents/Cu. Yd.)	Disting and Blasting Costs (Cents/Cu. Yd.)
Tulsa, Oklahoma	Limestone	7.3	17.3
Dallas, Texas	Limestone	5.2	15.1
San Francisco, Calif.	Sandstone	15.0	30.0
Merriam, Kansas	Sandstone	2.1	11.7
Nelsonville, Ohio	Sandstone	5.7	13.8
Philadelphia, Pa.	Limestone	11.5	19.3
Carbo, Virginia	Sandstone	8.6	15.7
Hibbing, Minn.	Frost	25.0	60.0
Hibbing, Minn.	Paint Rock	6.1	54.5

of ripping; he has the quality earthmoving equipment for your job. Ask for a demonstration.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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Usually, Tyler can give you the answer based on actual operating experience. But when new ideas and new problems are presented, our Customer Service Laboratory will dig in and come up with the solution. Samples of your raw material can be shipped to this Laboratory and tested on a variety of equipment, to pre-determine capacity and performance in plant operation. This enables us to positively recommend the proper screen for your requirements... by selection from over 53,000 existing specifications,

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International Harvester's NEW coal preparation plant

turns D-seam coal into grade-A product

Plant is a model of simplicity and efficiency . . . was designed and built entirely by LINK-BELT

For many years, the B and C seams of this mine provided clean metallurgical coal for the Wisconsin Steel Division of International Harvester Company. But the currently mined D seam poses a problem . . . its coal requires preparation before it can be fed to the plant's coke ovens in Chicago.

The new coal preparation plant, built and equipped by Link-Belt, solves the problem . . . processes 400 tph of R.O.M. coal. Only a small amount of equipment is required and all operations are integrated with a high-capacity Link-Belt air-pulsated wash box into which coal is fed and automatically separated from refuse. The end result is a uniform, high-quality product.

Perhaps Link-Belt's coal preparation equipment and more than 60 years' experience can be put to work for you. For details, contact your nearest Link-Belt office or write for Book 2655. Ask too about our color-sound film. "Preparation Makes the Product." It's available free for group showings.



LINK-BELT AIR-PULSATED WASH BOX receives coal at a rate of 400 tph. Clean coal flows through the box and settled heavy rejects are withdrawn by refuse wheels. After leaving the wash box, float coal is dewatered and sized on a Link-Belt double-deck vibrating screen.



COAL PREPARATION AND HANDLING EQUIPMENT

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